Assembly and operating instructions

REMKO ML...DC

ML 263 DC, ML 353 DC, ML 523 DC

Inverter wall-mounted room air conditioner with split design

0049-2015-07 Edition 4, en_GB

Read the instructions prior to performing any task!

Read these operating instructions carefully before commissioning / using this device!

These instructions are an integral part of the system and must always be kept near or on the device.

Subject to modifications; No liability accepted for errors or misprints!

Installation and operating instructions (translation of the original)

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1 Safety and usage instructions

1.1 General safety notes

Carefully read the operating manual before commissioning the units for the first time. It contains useful tips and notes such as hazard warnings to prevent personal injury and material damage. Failure to follow the directions in this manual not only presents a danger to people, the environment and the system itself, but will void any claims for liability.

Keep this operating manual and the refrigerant data sheet near to the units.

1.2 Identification of notes

This section provides an overview of all important safety aspects for proper protection of people and safe and fault-free operation.The instructions and safety notes contained within this manual must be observed in order to prevent accidents, personal injury and material damage.

Notes attached directly to the units must be observed in their entirety and be kept in a fully legible condition.

Safety notes in this manual are indicated by symbols. Safety notes are introduced with signal words which help to highlight the magnitude of the danger in question.

DANGER!

Contact with live parts poses an immediate danger of death due to electric shock. Damage to the insulation or individual components may pose a danger of death.

DANGER!

This combination of symbol and signal word warns of a situation in which there is immediate danger, which if not avoided may be fatal or cause serious injury.

WARNING!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may be fatal or cause serious injury.

CAUTION!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may cause injury or material and environmental damage.

NOTICE!

This combination of symbol and signal word warns of a potentially hazardous situation, which if not avoided may cause material and environmental damage.

This symbol highlights useful tips and recommendations as well as information for efficient and fault-free operation.

1.3 Personnel qualifications

Personnel responsible for commissioning, operation, maintenance, inspection and installation must be able to demonstrate that they hold a qualification which proves their ability to undertake the work.

1.4 Dangers of failure to observe the safety notes

Failure to observe the safety notes may pose a risk to people, the environment and the units. Failure to observe the safety notes may void any claims for damages.

In particular, failure to observe the safety notes may pose the following risks:

- The failure of important unit functions.
- The failure of prescribed methods of maintenance and repair.
- Danger to people on account of electrical and mechanical effects.

1.5 Safety-conscious working

The safety notes contained in this manual, the existing national regulations concerning accident prevention as well as any internal company working, operating and safety regulations must be observed.

1.6 Safety notes for the operator

The operational safety of the units and components is only assured providing they are used as intended and in a fully assembled state.

- The units and components may only be set up, installed and maintained by qualified personnel.
- Protective covers (grille) over moving parts must not be removed from units that are in operation.
- Do not operate units or components with obvious defects or signs of damage.
- Contact with certain unit parts or components may lead to burns or injury.
- The units and components must not be exposed to any mechanical load, extreme levels of humidity or extreme temperature.
- Spaces in which refrigerant can leak sufficient to load and vent. Otherwise there is danger of suffocation.
- All housing parts and device openings, e.g. air inlets and outlets, must be free from foreign objects, fluids or gases.
- The units must be inspected by a service technician at least once annually. Visual inspections and cleaning may be performed by the operator when the units are disconnected from the mains.

1.7 Safety notes for installation, maintenance and inspection

- Appropriate hazard prevention measures must be taken to prevent risks to people when performing installation, repair, maintenance or cleaning work on the units.
- The setup, connection and operation of the units and its components must be undertaken in accordance with the usage and operating conditions stipulated in this manual and comply with all applicable regional regulations.
- Local regulations and laws such as Water Ecology Act must be observed.
- The power supply should be adapted to the requirements of the units.
- Units may only be mounted at the points provided for this purpose at the factory. The units may only be secured or mounted on stable structures, walls or floors.
- Mobile units must be set up securely on suitable surfaces and in an upright position. Stationary units must be permanently installed for operation.
- The units and components should not be operated in areas where there is a heightened risk of damage. Observe the minimum clearances.
- The units and components must be kept at an adequate distance from flammable, explosive, combustible, abrasive and dirty areas or atmospheres.
- Safety devices must not be altered or bypassed.

1.8 Unauthorised modification and changes

Modifications or changes to units and components are not permitted and may cause malfunctions. Safety devices may not be modified or bypassed. Original replacement parts and accessories authorised by the manufactured ensure safety. The use of other parts may invalidate liability for resulting consequences.

1.9 Intended use

Depending on the model, the units and the additional fittings with which they are equipped are only intended to be used as an air-conditioner for the purpose of cooling or heating the air in an enclosed space.

Any different or additional use is a non-intended use. The manufacturer/supplier assumes no liability for damages arising from a non-intended use. The user bears the sole risk in such cases. Intended use also includes working in accordance with the operating and installation instructions and complying with the maintenance requirements.

The threshold values specified in the technical data must not be exceeded.

1.10 Warranty

For warranty claims to be considered, it is essential that the ordering party or its representative complete and return the "certificate of warranty" to REMKO GmbH & Co. KG at the time when the units are purchased and commissioned.

The warranty conditions are detailed in the "General business and delivery conditions". Furthermore, only the parties to a contract can conclude special agreements beyond these conditions. In this case, contact your contractual partner in the first instance.

1.11 Transport and packaging

The devices are supplied in a sturdy shipping container. Please check the equipment immediately upon delivery and note any damage or missing parts on the delivery and inform the shipper and your contractual partner. For later complaints can not be guaranteed.

⚠ WARNING!

Plastic films and bags etc. are dangerous toys for children!

Why:

- Leave packaging material are not around.

- Packaging material may not be accessible to children!

1.12 Environmental protection and recycling

Disposal of packaging

All products are packed for transport in environmentally friendly materials. Make a valuable contribution to reducing waste and sustaining raw materials. Only dispose of packaging at approved collection points.

Disposal of equipment and components

Only recyclable materials are used in the manufacture of the devices and components. Help protect the environment by ensuring that the devices or components (for example batteries) are not disposed in household waste, but only in accordance with local regulations and in an environmentally safe manner, e.g. using certified firms and recycling specialists or at collection points.

2 Technical data

2.1 Unit data

Series		ML 263 DC	ML 353 DC	ML 523 DC
Operating mode		Inverter wall-mounted room air conditioner combination for cooling and heating		
Nominal cooling output [1]	kW	2.80 (1.00-3.70)	3.50 (1.10-4.10)	5.10 (3.10-6.20)
Energy efficiency ratio SEER [1]		5.7	5.8	6.5
El. rated power consumpt., cooling [1]	kW	0.90	1.05	2.19
El. rated current consumpt., cooling [1]	A	3.90	4.50	9.50
Power consumption, annual, Q_{CE} [3]	kWh	172	187	269
Energy efficiency ratio, cooling [1]		A+	A+	A++
Nominal heat capacity [2]	kW	2.60 (0.90-3.80)	3.70 (1.00-4.40)	5.30 (1.50-6.40)
Energy efficiency ratio SCOP [4]		3.8	3.8	3.8
El. rated power consumpt., heating [2]	kW	0.72	0.91	1.89
El. rated current consumpt., heating [2]	A	3.10	3.90	8.20
Power consumption, annual, Q_{HE} [3]	kWh	958	1179	1805
Energy efficiency ratio, heating[2]		A	A	A
Max. power consumption	kW	2.00	2.30	2.55
Max. current consumption	A	9.00	10.50	11.50
EDP no.		1633263	1633353	1633523

Data specific to indoor unit		ML 263 DC IT	ML 353 DC IT	ML 523 DC IT
From serial number:		1305...	1307...	1309...
Application area (room vol.), approx.	m^3	80	110	160
Adjustment range, room temperature	°C	+17 to +30 +8 with "FP" function		
Operating range	°C	+17 to +32		
Air flow volume per level	m^3/h	400/530/620	410/570/640	440/500/680
Sound pressure level p. speed set. [5]	dB (A)	29/37/41	29/39/42	28/31/33
Sound pres. level, Silent/Turbo mode [5]	dB (A)	26/43	22/44	26/41
Sound power level max.	dB(A)	58	58	55
Enclosure class	IP	X 0		
Condensate drainage connection	mm	18		
Dimensions: H/W/D	mm	275/800/188	275/800/188	275/940/205
Weight	kg	6.5	8.0	9.0
EDP no.		1633264	1633354	1633524

Data specific to outdoor unit		ML 263 DC AT	ML 353 DC AT	ML 523 DC AT
Power supply	V/Ph/Hz	230 / 1~ / 50		
Operating range, cooling	°C	+5 to +50		
Operating range, heating	°C	+5 to +30 [7)]		
Air flow rate, max.	m³/h	1800	1800	2200
Enclosure class	IP	24		
Sound power level max.	dB (A)	64	64	62
Sound pressure level [5)]	dB (A)	56	56	54
Refrigerant [6)]		R 410A		
Refrigerant, basic capacity	kg	0.80	0.80	1.25
Max. operating pressure	kPa	4200 / 1500		
Refrigerant, additional quantity >5m	g/m	20		
Refrigerant piping, max. length	m	25	25	30
Refrigerant piping, max. height	m	10	10	15
Refrigerant connection Liquid line	Inches (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)
Refrigerant connection Suction pipe	Inches (mm)	3/8 (9.52)	3/8 (9.52)	1/2 (12.70)
Dimensions: H/W/D	mm	540/780/250	540/780/250	590/760/285
Weight	kg	29.50	29.50	35.0
From serial number		1306...	1308...	1310...
EDP no.		1633265	1633355	1633525

[1)] Air inlet temp. TK 27°C / FK 19°C, outside temperature TK 35°C, FK 24°C, max. air flow volume, 5m pipe length

[2)] Air inlet temp. TK 20°C, outside temperature TK 7°C, FK 6°C, max. air flow volume, 5m pipe length

[3)] The specified value is based on results from standard testing.
The actual consumption depends on the use and location of the unit

[4)] The specified value is based on the average heating period

[5)] At distance of 1m in the open air; specified values are maximum values

[6)] Contains greenhouse gas in accordance with the Kyoto protocol, GWP 1975 (for further information, see chapter "Ad

[7)] This can be extended to -15°C with the appropriate accessory kit

2.2 Unit dimensions

Outdoor units

Fig. 1: Outdoor unit dimensions ML 263 DC AT-523 DC AT (All measurements in mm)

Dimensions (mm)	A	B	C	D	E
ML 263 DC AT-353 DC AT	540	780	250	549	276
ML 523 DC AT	590	760	285	535	285

Indoor units

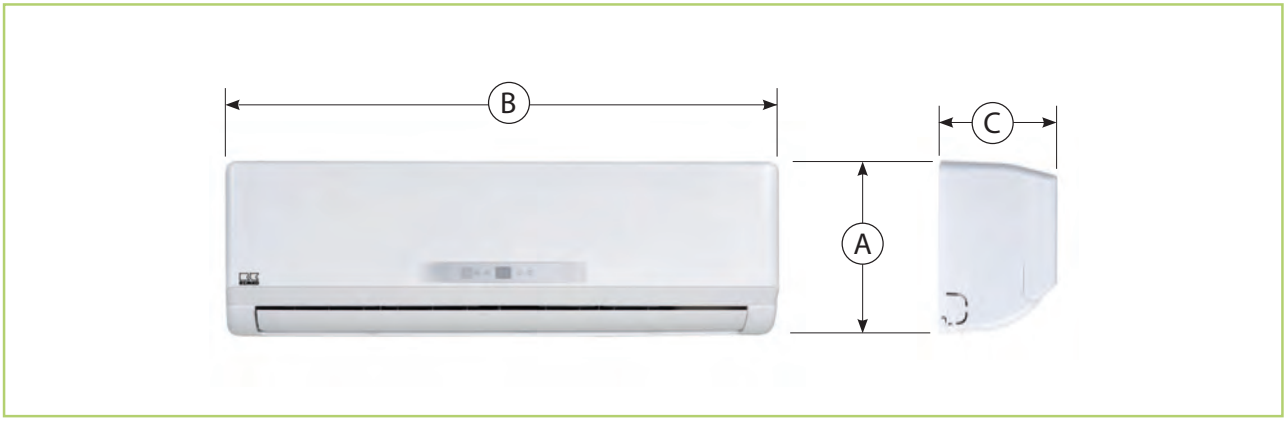

Fig. 2: Indoor unit dimensions ML 263 DC IT-523 DC IT (All measurements in mm)

Dimensions (mm)	A	B	C
ML 263 DC IT-353 DC IT	275	800	188
ML 523 DC IT	275	940	205

We reserve the right to modify the dimensions and design as part of the ongoing technical development process.

2.3 Performance curves for heating and cooling

Heating capacity ML 263 DC

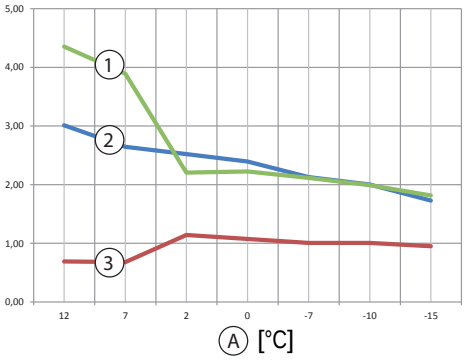

Fig. 3: Performance curves, heating ML 263 DC (data for 20 °C indoor temperature)

A: Outside temperature
1: COP
2: Heating capacity in kW
3: Power consumption in kW

Outside temp. in °C	12	7	2	0	-7	-10	-15
Heating capacity in kW	3.01	2.65	2.52	2.39	2.13	2.00	1.73
Power consumption in kW	0.69	0.68	1.14	1.08	1.01	1.01	0.95
COP	4.35	3.89	2.21	2.23	2.12	1.99	1.82

Cooling capacity ML 263 DC

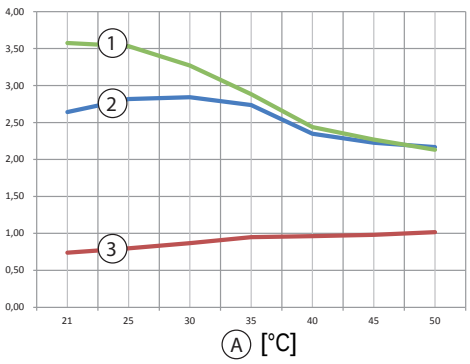

Fig. 4: Performance curves, cooling ML 263 DC (data for 27/19 °C indoor temperature)

A: Outside temperature
1: EER
2: Cooling capacity in kW
3: Power consumption in kW

Outside temp. in °C	21	25	30	35	40	45	50
Cooling capacity in kW	2.64	2.82	2.84	2.74	2.35	2.23	2.17
Power consumption in kW	0.74	0.80	0.87	0.95	0.96	0.98	1.02
EER	3.57	3.53	3.27	2.88	2.44	2.27	2.13

Heating capacity ML 353 DC

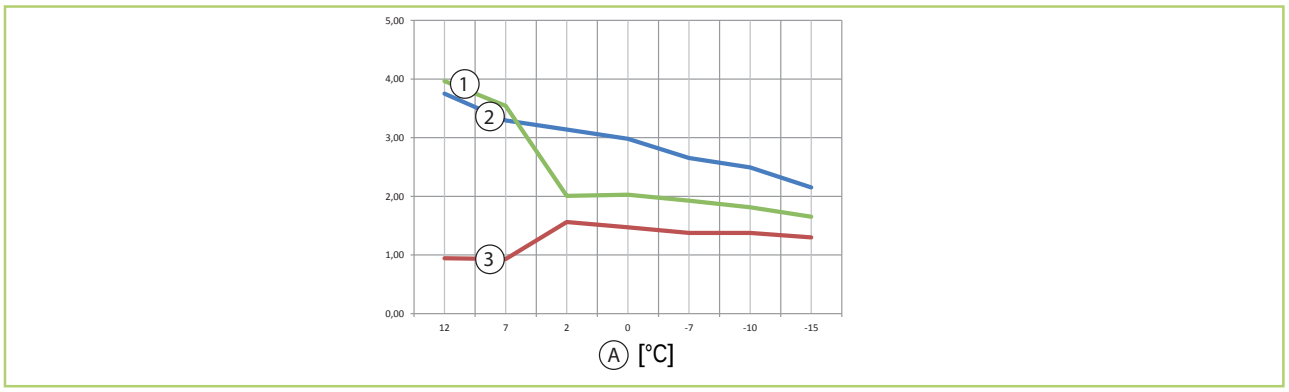

Fig. 5: Performance curves, heating ML 353 DC (data for 20 °C indoor temperature)

A: Outside temperature
1: COP
2: Heating capacity in kW
3: Power consumption in kW

Outside temp. in °C	12	7	2	0	-7	-10	-15
Heating capacity in kW	3.75	3.30	3.14	2.98	2.65	2.49	2.15
Power consumption in kW	0.95	0.93	1.56	1.47	1.38	1.38	1.30
COP	3.96	3.54	2.01	2.03	1.93	1.81	1.65

Cooling capacity ML 353 DC

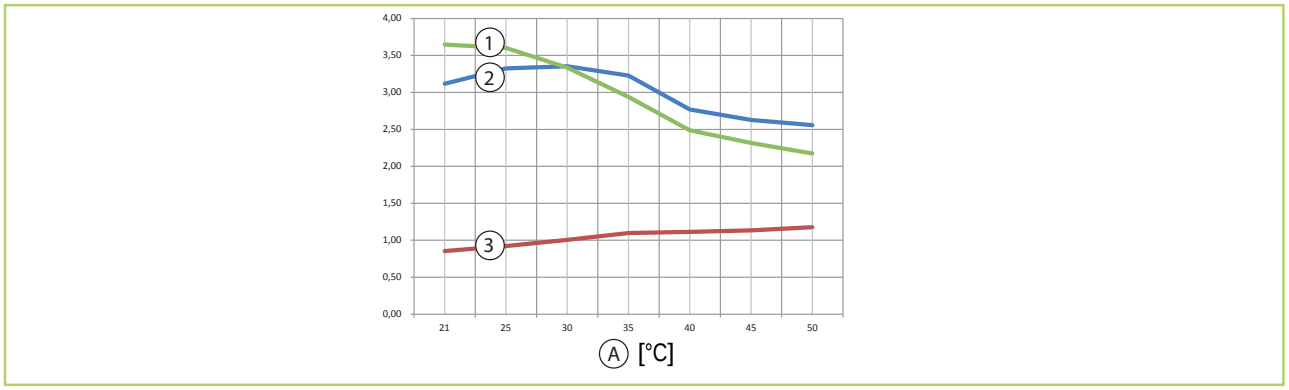

Fig. 6: Performance curves, cooling ML 353 DC (data for 27/19 °C indoor temperature)

A: Outside temperature
1: EER
2: Cooling capacity in kW
3: Power consumption in kW

Outside temp. in °C	21	25	30	35	40	45	50
Cooling capacity in kW	3.12	3.32	3.35	3.23	2.77	2.63	2.56
Power consumption in kW	0.85	0.92	1.00	1.10	1.11	1.13	1.18
EER	3.65	3.60	3.34	2.94	2.49	2.32	2.17

Heating capacity ML 523 DC

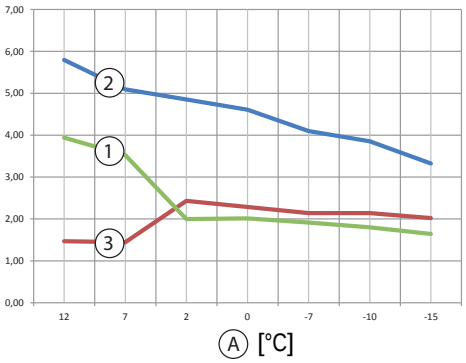

Fig. 7: Performance curves, heating ML 523 DC (data for 20 °C indoor temperature)

A: Outside temperature
1: COP
2: Heating capacity in kW
3: Power consumption in kW

Outside temp. in °C	12	7	2	0	-7	-10	-15
Heating capacity in kW	5.79	5.09	4.85	4.61	4.10	3.85	3.33
Power consumption in kW	1.47	1.45	2.43	2.29	2.14	2.14	2.02
COP	3.94	3.52	2.00	2.01	1.92	1.80	1.64

Cooling capacity ML 523 DC

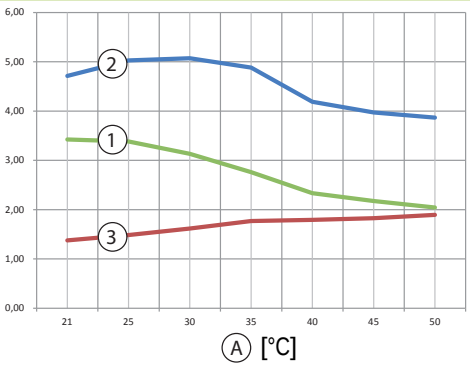

Fig. 8: Performance curves, cooling ML 523 DC (data for 27/19 °C indoor temperature)

A: Outside temperature
1: EER
2: Cooling capacity in kW
3: Power consumption in kW

Outside temp. in °C	21	25	30	35	40	45	50
Cooling capacity in kW	4.71	5.03	5.07	4.88	4.19	3.97	3.87
Power consumption in kW	1.38	1.49	1.62	1.77	1.79	1.83	1.89
EER	3.42	3.38	3.13	2.76	2.34	2.17	2.04

3 Design and function

3.1 Unit description

The ML 263 DC-523 DC room air conditioners have a REMKO ML...AT outdoor unit as well as an ML...IT indoor unit.

In cooling mode, the outdoor unit serves to output the heat extracted by the indoor unit from the room being cooled. In heating mode, the heat taken up by the outdoor unit can be discharged by the indoor unit into the room to be heated. In both operating modes, the output produced by the compressor precisely matches requirements, and thereby regulates the nominal temperature with minimal temperature deviations. This "inverter technology" results in energy savings over conventional split systems and also reduces noise emissions to a particularly low level. The outdoor unit can be installed in an outdoor area or, providing that certain requirements are met, an indoor area. The indoor unit is designed to be mounted high up on the wall, in indoor areas. It is operated by an infrared remote control.

The outdoor unit consists of a cooling cycle with compressor, fin condenser, condenser fan, reversing valve and throttle element. The outdoor unit is controlled by the controller in the indoor unit.

The indoor unit consists of a fin evaporator, evaporator fan, controller and condensate tray.

Floor brackets, wall brackets, refrigerant piping and condensate pumps are available as accessories.

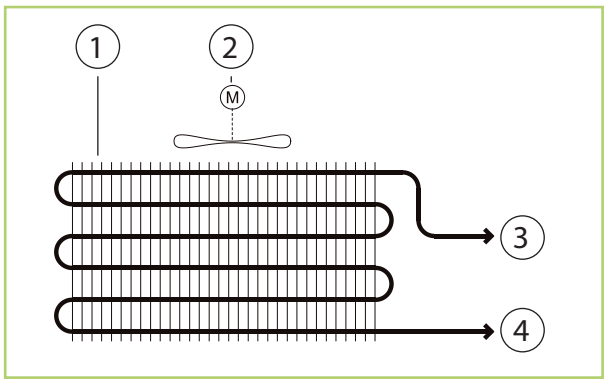

Fig. 9: Cooling cycle diagram for indoor unit

1: Evaporator
2: Evaporator fan
3: Suction pipe connection
4: Liquid line connection

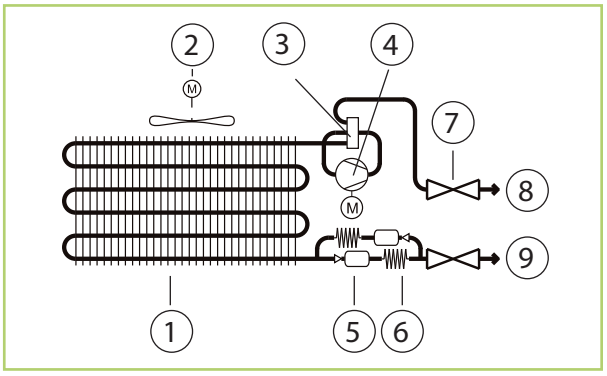

Fig. 10: Cooling cycle diagram for outdoor unit

1: Condenser
2: Condenser fan
3: Reversing valve
4: Compressor
5: Filter dryer
6: Capillary tube throttle element
7: Pressure gauge connection
8: Suction pipe connection valve
9: Liquid line connection valve

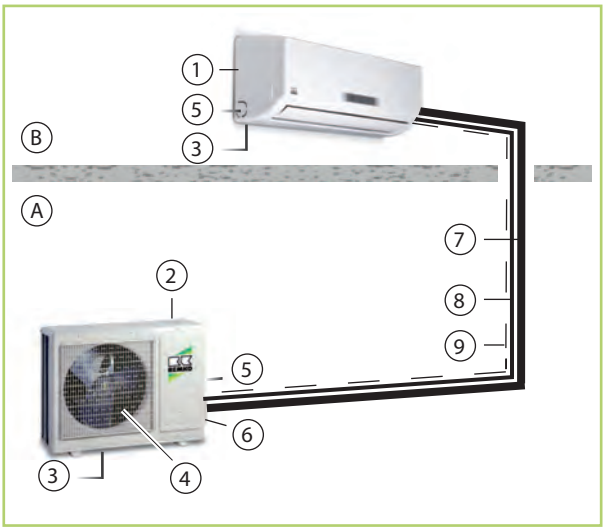

Fig. 11: System layout

A: Outdoor area
B: Indoor area
1: Indoor unit
2: Outdoor unit
3: Condensate drainage line
4: Condenser fan
5: Power supply
6: Shut-off valve
7: Suction pipe
8: Liquid line
9: Control line

Refrigerant piping is used to connect the indoor unit to the outdoor unit.

4 Operation

The indoor unit is easily operated using the standard infrared remote control. The indoor unit beeps to acknowledge the correct transmission of data. If it is not possible to program the indoor unit with the remote control, then it can also be manually operated.

Manual mode

The indoor units can be put into operation manually. After the air inlet screen has been opened, the inner recessed key can be pressed and automatic mode can be activated. In manual mode, the following settings apply:

Cooling mode: last setting

Fan speed: AUTO

Heating mode: last setting

Fan: AUTO

Press a key on the infrared remote control to interrupt manual mode.

Infrared remote control

The infrared remote control sends the programmed settings a distance of up to 6 m to the receiver of the indoor unit. Data will only be received correctly if the remote control is pointed at the receiver and no objects are obstructing the transmission path.

Two AAA batteries must be inserted into the remote control in preparation. To do so, remove the flap from the battery compartment and insert the batteries the correct way around (see markings). Removing the batteries causes all stored data to be lost. The remote control will then access the default settings, which you are free to customise at any time.

Fig. 12: Maximum distance

Alarms are indicated by a code (see chapter Troubleshooting and customer service).

! NOTICE!

Immediately replace flat batteries with a new set, otherwise there is a risk of leakage. It is recommended that the batteries are removed if the equipment is shut down for longer periods.

Help save on energy consumption in stand-by mode! If the device, system or component is not in use, we recommend disconnecting the power supply. Components with a safety function is excluded from our recommendation!

Display on indoor unit

The display illuminates according to the settings.

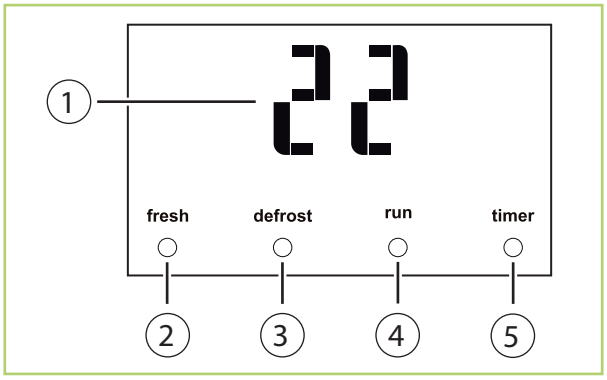

Fig. 13: Display on indoor unit

1: Set setpoint/fault indicator
2: Ionic function activated/deactivated
3: De-frosting function activated or pre-heating (in heating mode) activated
4: Operating lamp
5: Timer activated/deactivated

Keys on the remote control

Fig. 14: Keys on the remote control

① **"ON/OFF" key**

Press this key to put the unit into operation and take it out of operation.

② **"MODE" key**

Press this key to select the operating mode. The indoor unit has 5 modes:

1. Automatic mode

In this mode, the unit works in cooling or in heating mode.

2. Cooling mode

In this mode, the warm air in the room is cooled down to the preset temperature.

3. Dehumidification mode

In this mode, the room is dehumidified, and in doing so the room temperature is significantly lowered. It is not possible to influence the temperature and humidity in this mode.

4. Heating mode

In this mode, the warm air in the room is heated up to the desired temperature.

5. Recirculation mode

In this mode, the air in the room is recirculated. Temperature selection is not possible.

③ **"FAN" key**

Press this key to set the desired fan speed. 4 speeds are available:

Automatic, low, medium and high fan stage.

④ **"SLEEP/FRESH" key**

"SLEEP" key

Pressing this key will automatically increase or decrease the target temperature by 1 °C within an hour in cooling and heating mode respectively. Press this key to maintain the most convenient temperature and save energy. This function is only available in "Cooling", "Heating" and "Auto" modes. If the unit is working in "SLEEP" mode, this activity is interrupted by pressing the "MODE", "FAN", "Speed" or "ON/OFF" keys.

"FRESH" key

Activates the unit's ion generator. This releases negatively charged particles into the airflow, which neutralises the influences of smoke and dust, among other things.

⑤ **"TURBO" key**

The "TURBO" function allows the preset temperature to be reached in the shortest possible time. Pressing this key in "Cooling mode" causes the unit to blow a blast of cooling air into the room at a very high fan speed.

⑥ **"SELF CLEAN" key**

This key activates the self-clean function.

⑦ **" ▲ " and " ▼ " keys**

The " ▲ " key increases the desired temperature to 30°C in 1°C increments.

The " ▼ " key decreases the desired temperature to 17°C in 1°C increments.

⑧ **"LED" key**

This key switches the lighting on the indoor unit off and back on again.

⑨ "FOLLOW ME" key

Pressing this key initiates the "Follow Me" function. The display on the remote control shows the actual temperature of the current location of the remote control. The remote control transmits this signal to the air conditioning unit at intervals of 3 minutes, until the "Follow Me" key is pressed again. The air conditioning unit automatically cancels the "Follow Me" function if it has not received the signal for a period of 7 minutes.

⑩ "SILENT MODE" / "FP" key

This key activates/deactivates Silent mode.

The fan speed is reduced to a minimum.

In this mode, the air conditioning unit operates silently.

The "FP" (Freeze Protection) key activates a frost protection function with which the setpoint in heat mode is set to ca. 8°C.

⑪ "TIMER ON" key

This key initiates the automatic switch-on time for the unit. Each time the key is pressed, the automatic time setting increases in increments of 30 minutes. Once the time setting shows 10.0, the automatic time setting increases in increments of 60 minutes each time the key is pressed. In order to cancel the automatic time setting, simply set the automatic switch-on time to 0.0.

⑫ "TIMER OFF" key

This key initiates the automatic switch-off time for the unit. Each time the key is pressed, the automatic time setting increases in increments of 30 minutes. Once the time setting shows 10.0, the automatic time setting increases in increments of 60 minutes each time the key is pressed. In order to cancel the automatic time setting, simply set the automatic switch-off time to 0.0.

⑬ "Fin setting horizontal" key

This key sets the position of the horizontal exhaust fins. Each time the key is pressed, the fins change position by 6 degrees.

In addition, this key is used to stop and start the automatic "Swing" function of the horizontal exhaust fins.

⑭ "Fin setting vertical" key

This key has no function.

Indicators on the LCD

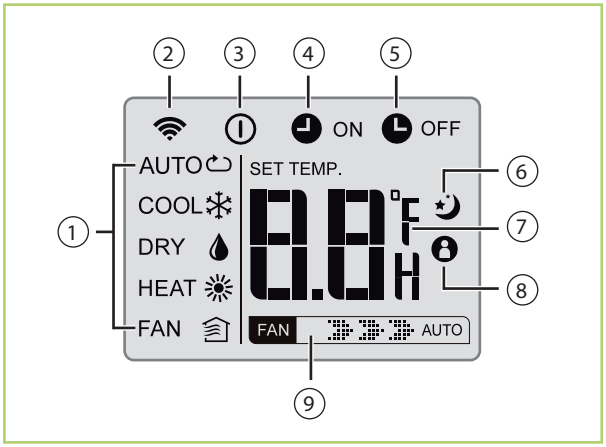

Fig. 15: Indicators on the LCD

1: Mode indicator - shows the current operating modes, including Auto (↻), Cooling (❄), Dehumidification (💧), Heating (☀), Fan (≋) and back to Auto (↻) mode.
2: Signal transmission symbol. This symbol appears when signals are being transmitted from the remote control to the indoor unit.
3: ON/OFF symbol. This symbol appears when the "ON/OFF" key is pressed. Pressing this key again causes the indicator to go out.
4: TIMER ON symbol. This symbol appears when TIMER ON is switched on.
5: TIMER OFF symbol. This symbol appears when TIMER OFF is switched on.
6: Sleep symbol. This symbol appears when the "Sleep" function is activated. Pressing this key again causes the indicator to go out.
7: Temperature/Timer symbol. Shows the temperature setting (-17°C~30°C). If "FAN" mode is selected, the temperature setting is not displayed. In Timer mode, the ON and OFF settings appear for the TIMER.
8: FOLLOW ME symbol. This symbol appears when the "Follow me" function is activated.
9: Fan speed symbol. This is where the selected fan speeds are displayed: AUTO (no indicator) and the three fan speed settings: (slow), (medium) and (fast). The fan speed is set to "Automatic" when either "Auto" or "Dehumidification" mode is activated.

The illustration of the LCD with all of the symbols present is only intended to provide a clearer overview. During operation, only those symbols relevant to the respective functions appear on the display.

Key functions

A symbol is shown on the display to indicate that the settings are being transferred.

"Auto" mode

Make sure that the indoor unit is connected to the power supply, and is switched on.

The operating mode indicator on the display of the indoor unit begins to flash.

1. Press the **"MODE"** key to select "Auto" mode.
2. Press the **"UP/DOWN"** key to set the desired temperature. The temperature can be set between 17 and 30°C, in increments of 1°C.
3. Press the **"ON/OFF"** key to switch on the air conditioning unit.

Fig. 16: "Auto" mode

– *In "Auto" mode, the air conditioning unit is able to logically select between the "Cooling" , "Recirculation" and "Heating" modes, specifically by detecting the difference between the actual room temperature and the temperature set on the remote control.*
– *In "Auto" mode, it is not possible to set the fan speed. This is already controlled automatically.*
– *If "Auto" mode is not comfortable enough for you, you can also select the desired mode manually.*

"Cooling", "Heating" and "Recirculation" mode

Make sure that the indoor unit is connected to the power supply, and is switched on.

1. Press the **"MODE"** key to select from operating modes "Cooling", "Heating" or "Recirculation".
2. Press the **"UP/DOWN"** key to set the desired temperature. The temperature can be set between 17 and 30°C, in increments of 1°C.
3. Press the **"FAN"** key to select from the four fan speeds (Auto, slow, medium and fast).
4. Press the **"ON/OFF"** key to switch on the air conditioning unit.

Fig. 17: "Cooling", "Heating" and "Recirculation" mode

– *In "Fan" mode, the temperature setting is not shown on the remote control, and it is not possible to check the room temperature. In this case steps 1, 3 and 4 can be carried out.*

"Dehumidification" mode

Make sure that the indoor unit is connected to the power supply, and is switched on.

The operating mode indicator on the display of the indoor unit begins to flash.

1. Press the **"MODE"** key to select "Dehumidification" mode.
2. It is not possible to set a temperature here.
3. Press the **"ON/OFF"** key to switch on the air conditioning unit.

Fig. 18: "Dehumidification" mode

In "Dehumidification" mode, it is not possible to set the fan speed. This is already controlled automatically.

"Timer" mode

Press the "TIMER ON" key to set the "Auto on" time and the "TIMER OFF" key to set the "Auto off" time for the unit.

Setting the "Auto on" time

1. Press the "TIMER ON" key. The remote control shows "TIMER ON", the last "Auto on" time setting and the symbol "H" appears on the display. The unit is now ready to reset the "Auto on" time and to start "TIMER ON" mode.
2. Press the "TIMER ON" key again to set the desired "Auto on" time. Each time the key is pressed, the time is increased by half an hour between 0 and 10 hours, and by an hour between 10 and 24 hours.
3. Once these settings have been made, there is a one second delay before the remote control transmits the signal to the indoor unit. Then, after approx. two seconds, the "H" symbol disappears from the LCD display, and the set temperature appears again on the display.

Fig. 19: "Timer" mode

Setting the "Auto off" time

1. Press the "TIMER OFF" key. The remote control shows "TIMER OFF", the last "Auto off" time setting and the symbol "H" appears on the display. The unit is now ready to reset the "Auto off" time and to stop "TIMER OFF" mode.
2. Press the "TIMER OFF" key again to set the desired "Auto off" time. Each time the key is pressed, the time is increased by half an hour between 0 and 10 hours, and by an hour between 10 and 24 hours.
3. Once these settings have been made, there is a one second delay before the remote control transmits the signal to the indoor unit. Then, after approx. two seconds, the "H" symbol disappears from the LCD display, and the set temperature appears again on the display.

- *When Timer mode is selected, the remote control automatically transfers the timer signal to the indoor unit for the specified period of time. Therefore, you should hold the remote control in a location where it can transfer the signal to the indoor unit without interference.*
- *The effective operation for the time settings by the remote control for the timer function is restricted to the following settings:*
  0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

Example TIMER function settings

"TIMER ON" (Auto on mode)

The "TIMER ON" function is useful if you want the unit to switch on automatically before you come home. The air conditioning unit will commence operation automatically at the set time.

Example:

You want the air conditioning unit to switch on six hours from the time it was programmed.

1. Press the "TIMER ON" key. The last operating time setting for the timer, and the "H" symbols, appear on the display.
2. Press the "TIMER ON" key until the desired start time is shown in the "TIMER ON" area on the remote control.
3. Wait for 3 seconds and the temperature appears again in this area of the digital display. The "TIMER ON" indicator stays lit, and this function is activated.

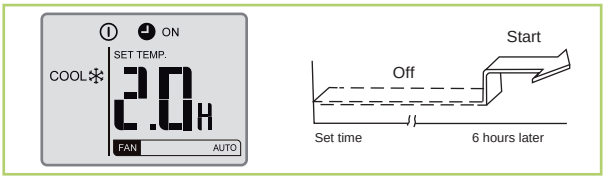

Fig. 20: "TIMER ON" example

"TIMER OFF" (Auto off mode)

The "TIMER OFF" function is useful if you want the unit to switch off automatically once you have gone to bed. The air conditioning unit will cease operation automatically at the set time.

Example:

You want the air conditioning unit to switch off ten hours from the time it was programmed.

1. Press the "TIMER OFF" key. The last operating time setting for the timer, and the "H" symbols, appear on the display.
2. Press the "TIMER OFF" key until "10H" is shown in the "TIMER OFF" area on the remote control.
3. Wait for 3 seconds and the temperature appears again in this area of the digital display. The "TIMER OFF" indicator stays lit, and this function is activated.

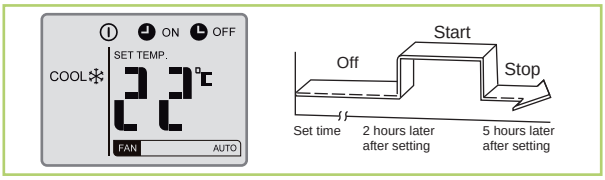

Fig. 21: "TIMER OFF" example

Combined TIMER (setting "TIMER ON" and "TIMER OFF" at the same time)

"TIMER OFF ⇨ "TIMER ON"

(On ⇨ Stop ⇨ Start)

This function is useful if you want the unit to switch off automatically once you have gone to bed, then to switch back on automatically when you get up or come home.

Example:

You want the air conditioning unit to switch off in two hours from the time it was programmed, and switch back on ten hours later.

1. Press the "TIMER OFF" key.
2. Press the "TIMER OFF" key again until the desired stop time is shown in the "TIMER OFF" area on the remote control.
3. Press the "TIMER ON" key.
4. Press the "TIMER ON" key again until "10H" is shown in the "TIMER ON" area on the remote control.
5. Wait for 3 seconds and the temperature appears again in this area of the digital display. The "TIMER ON" and "TIMER OFF" indicators stay lit, and this function is activated.

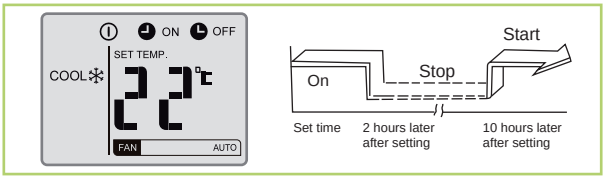

Fig. 22: "TIMER OFF" / "TIMER ON" example

"TIMER ON ⇨ "TIMER OFF"

(Off ⇨ Start ⇨ Stop)

This function is useful if you want the unit to switch on automatically before you wake up, then to switch off again once you have left the house.

Example:

You want the air conditioning unit to switch on in two hours from the time it was programmed, and switch back off five hours later.

1. Press the "TIMER ON" key.
2. Press the "TIMER ON" key again until "2.0H" is shown in the "TIMER ON" area on the remote control.
3. Press the "TIMER OFF" key.
4. Press the "TIMER OFF" key again until "5.0H" is shown in the "TIMER OFF" area on the remote control.
5. Wait for 3 seconds and the temperature appears again in this area of the digital display. The "TIMER ON" and "TIMER OFF" indicators stay lit, and this function is activated.

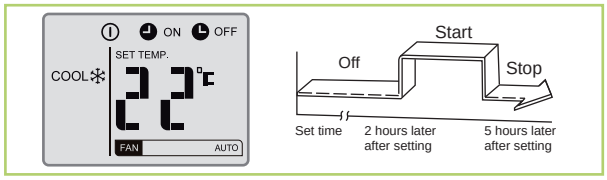

Fig. 23: "TIMER ON" / "TIMER OFF" example

The timer settings ("TIMER ON" or "TIMER OFF") which is made immediately after the set time will be activated first.

SLEEP function

In this function, the unit automatically increases (in cooling mode) or reduces (in heat mode) the temperature in the first two hours by 1°C an hour. For the next five hours, the temperature is them kept constant. Then this function is stopped.

The function maintains the most comfortable temperature while saving energy.

Fig. 24: "Sleep" function

The "SLEEP" function is only available in the "Cooling", "Heating" and "Auto" modes.

Adjusting the airflow direction

Use the "SWING" and "DIRECT" keys to achieve the desired airflow direction.

1. Press the "DIRECT" key to determine the horizontal position of the exhaust fins. Each time the "DIRECT" key is pressed, the fins change position by 6 degrees.
2. You can activate the "SWING" function by pressing the same key for longer. This causes the exhaust fins to move up and down automatically.

If the fins are moved to a position which would influence the cooling or heating effect of the air conditioning unit, they change their direction of movement automatically.

5 Installation instructions for qualified personnel

5.1 Important notes prior to installation

- Transport the unit in its original packaging as close as possible to the installation location. You avoid transport damage by doing so.
- Check the contents of the packaging for completeness and check the unit for visible transport damage. Report any damage immediately to your contractual partner and the shipping company.
- Lift the unit on the corners and not on the refrigerant or condensate drainage connections.
- The refrigerant piping (liquid and suction pipe), valves and connections must be insulated to make them vapour diffusion proof. If necessary also insulate the condensate drainage line.
- Select an installation location which allows air to freely flow through the air inlet and outlet (see section "Minimum clearances")
- Do not install the unit in the immediate vicinity of devices which generate intensive thermal radiation. Installation in the vicinity of thermal radiation reduces the unit output.
- Only open the shut-off valves on the refrigerant piping after installation is complete.
- Seal off open refrigerant piping with suitable caps or adhesive strips to prevent the infiltration of moisture and never kink or compress the refrigerant piping.
- Avoid unnecessary bends. This minimises the pressure loss in the refrigerant piping and ensures that the compressor oil can flow back without obstruction.
- Make special preparations regarding the oil return if the outdoor unit is located above the indoor unit (see section "Oil return measures").
- Add refrigerant if the basic length of the refrigerant piping exceeds 5 metres. For the quantity of additional refrigerant, refer to chapter "Adding refrigerant".
- Perform all electrical wiring in accordance with applicable DIN and VDE standards.
- Ensure the electrical cables are properly connected to the terminals, otherwise there is a risk of fire.
- Only use the fasteners contained in the scope of delivery with the units.
- Use four supports and the associated hooks to attach the ceiling cassette (only applies to ceiling cassettes).
- Use the insulated condensate hose in the scope of delivery as a junction piece to the continuing condensate drain. Secure the condensate drain with the supplied clamps.

5.2 Wall openings

- A wall opening of at least 70mm diameter and 10mm incline from the inside to the outside must be created.
- To prevent damage to the lines, the interior of the wall opening should be padded or, for example, lined with PVC pipe (see figure).
- After installation has been completed, use a suitable sealing compound to close off the wall opening, taking account of fire protection regulations (responsibility of customer). Do not use cement or lime containing substances!

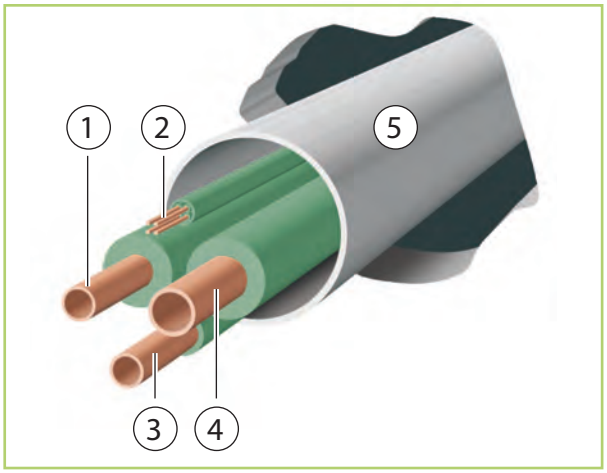

Fig. 25: Wall opening

1: Liquid line
2: Control line
3: Condensate drainage line
4: Suction pipe
5: PVC pipe

5.3 Installation materials

The indoor unit is attached to the wall by a wall bracket and 4 screws (to be provided by the customer).

The outdoor unit is attached by 4 screws and a wall bracket to the wall or fixed by a floor bracket to the ground.

5.4 Selection of installation location

Indoor unit

The indoor unit is designed for horizontal wall installation above doors. However, it can also be used in the upper wall area (min. 1.75m above the floor).

Outdoor unit

The outdoor unit is designed for horizontal installation on a base in outdoor areas. The installation site must be level, flat and firm. The unit should also be secured to prevent it from tipping over. The outdoor unit can be set up outside as well as inside a building. For external installation, please observe the following notes to protect the unit from the influence of the weather.

Rain

For floor or roof set-up, the unit should be installed with at least 10cm ground clearance. A floor bracket is available as an optional accessory.

Sun

The condenser on the outdoor unit emits heat. Exposure to sunlight further increases the temperature of the fins and reduces the heat released by the finned heat exchanger. The outdoor unit should be installed on to the north side of the building whenever possible. If necessary, take measures to provide sufficient shade (responsibility of customer). One possible solution is to build a small roofed area over the unit. These measures should not affect the flow of warm outlet air.

Wind

If the unit is being installed in windy areas, ensure that the warm outlet air is discharged in the prevailing wind direction. If this is not the possible, it may be necessary to install a windbreak (to be provided by the customer). Ensure that the windbreak does not adversely affect the air intake to the unit. An additional stabilization is recommended. This can, for example, be realized with ropes or other structures.

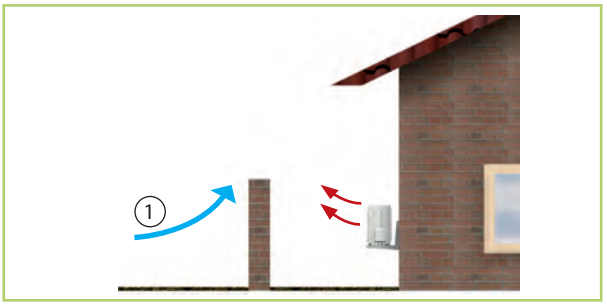

Fig. 26: Windbreak

1: Wind

Snow

The unit should be wall-mounted in areas of heavy snowfall. Installation should be at least 20cm above the expected level of snow to prevent snow from entering the outdoor unit. An optional wall bracket is available as an accessory.

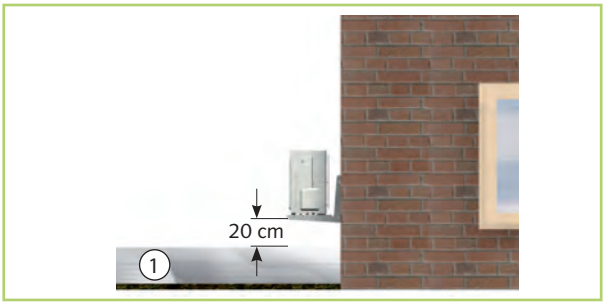

Fig. 27: Minimum clearance to snow

1: Snow

Installation inside buildings

- Ensure that heat can dissipate adequately when placing the outdoor unit in cellars, lofts, adjoining rooms or halls (Fig. 28).
- Install an additional fan with a rated flow comparative to that of the outdoor unit being installed in the room and which can compensate any additional pressure loss in ventilation ducts (Fig. 28).
- Comply with any regulations and conditions affecting the statics of the building. If necessary, fit acoustic installation.

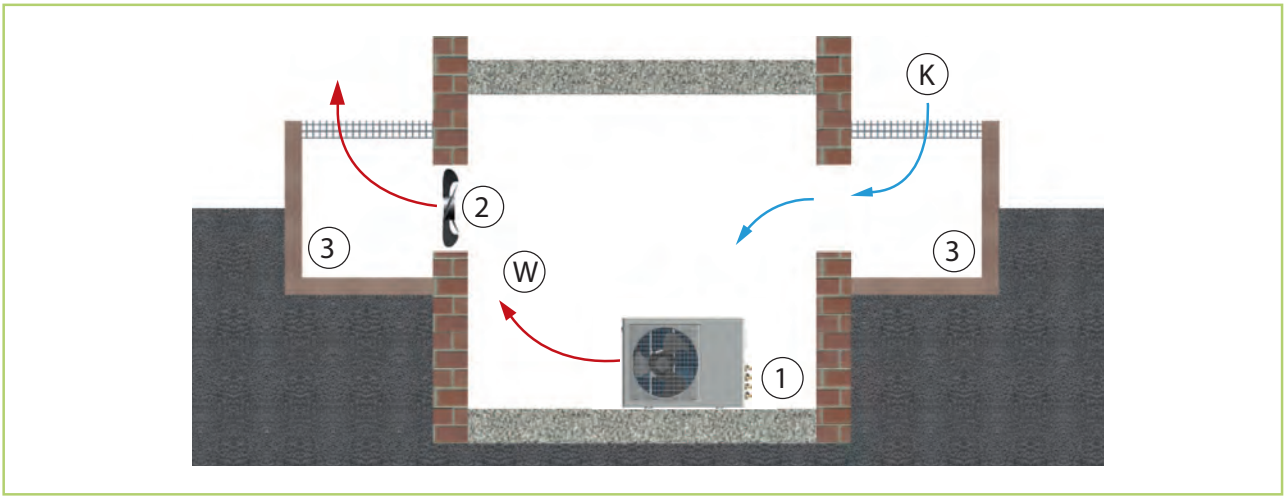

Fig. 28: Installation inside buildings

K: Cold fresh air
W: Warm air
1: Outdoor unit
2: Additional fan
3: Air shaft

5.5 Minimum clearances

Observe the minimum clearances to allow access for maintenance and repair work and facilitate optimum air distribution.

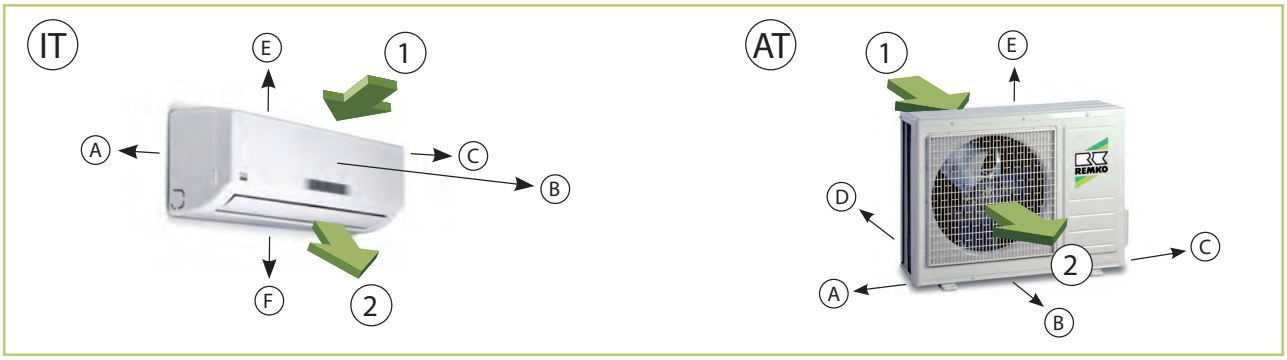

Fig. 29: Minimum clearances of the indoor unit and outdoor unit

AT: Outdoor unit
IT: Indoor unit
1: Air inlet
2: Air outlet

	Indoor units	Outdoor units
Dimensions (mm)	**ML 263 DC IT-523 DC IT**	**ML 263 DC AT-523 DC AT**
A	120	150
B	1500	700
C	120	400
D	-	150
E	120	200
F	1700	-

5.6 Oil return measures

If the outdoor unit is installed at a higher level than the indoor unit, suitable oil return measures must be taken. Usually, an oil pump bend is installed for every 2.5 metres of height difference.

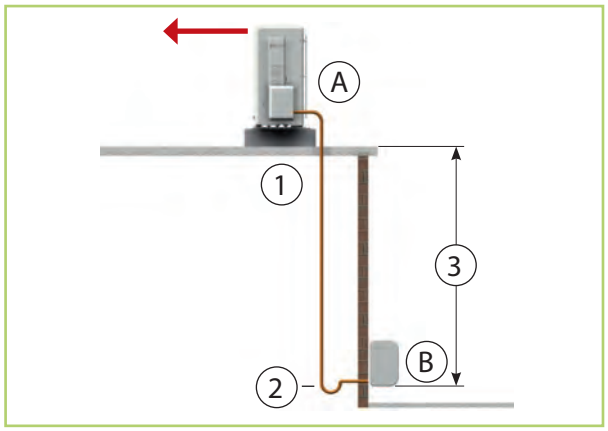

Fig. 30: Oil return measures

A: Outdoor unit
B: Indoor unit
1: One oil pump bend in suction pipe to outdoor unit every 2.5 metres of height difference
2: Radius: 50mm
3: Max. 10m

5.7 Connection variants for the indoor unit

The following connection variants can be used for the refrigerant, condensate and control lines.

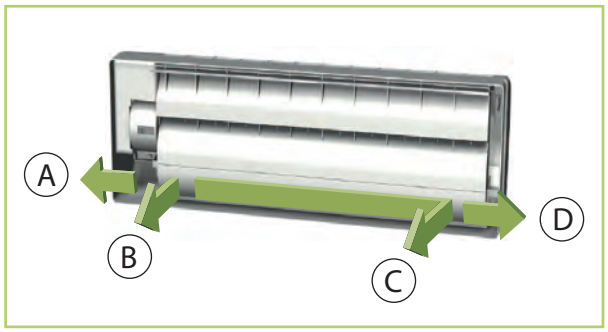

Fig. 31: Connection variants

A: Outlet on the wall, right
B: Outlet through the wall, right
C: Outlet through the wall, left
D: Outlet on the wall, left

5.8 Wall bracket for the indoor unit

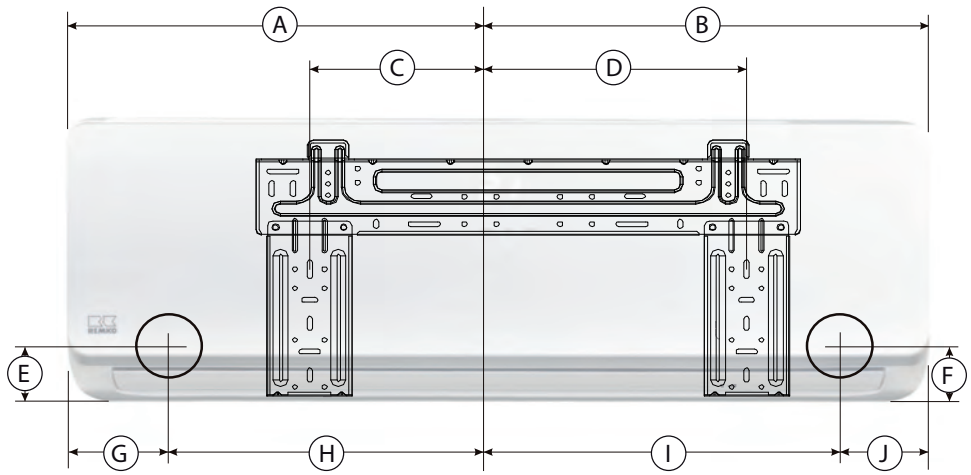

Fig. 32: Mounting points for the wall bracket ML 263 DC IT-523 DC IT (front view, all dimensions in mm)

Unit type / dimensions	A	B	C	D	E	F	G	H	I	J
ML 263 DC IT-353 DC IT	400	400	245	195	50	50	60	339	306	95
ML 523 DC IT	470	470	320	265	70	70	55	415	365	105

All dimensions in mm. In each case the diameter of the pipe break-through is Ø 65 mm

The wall bracket for the units must be attached with suitable screws and anchors.

6 Installation

6.1 Installation of the indoor unit

The indoor unit is attached by means of a wall bracket, taking into consideration the air outlet side located in the lower part.

1. Mark the mounting points on the structurally permissible building sections according to the dimensions of the wall bracket.
2. If necessary, remove the break out opening of the housing.
3. Connect the refrigerant piping, electrical cables and condensate drainage line to the indoor unit as described below.
4. Hang the indoor unit onto the wall bracket by tilting it back slightly and by pressing the bottom part of the unit against the bracket.
5. Check again that the unit is level. (Fig. 33)

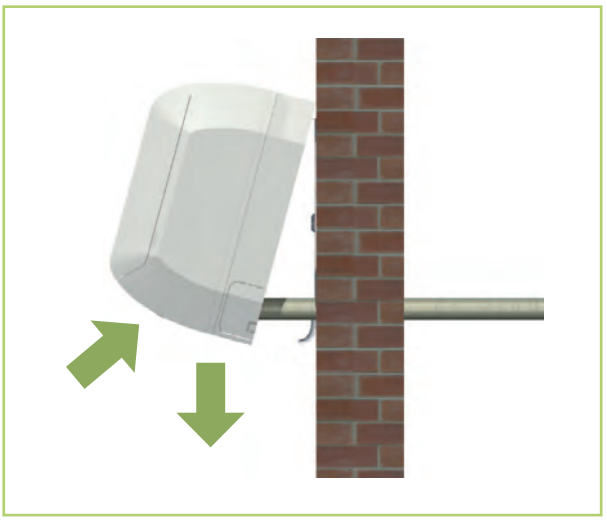

Fig. 33: Horizontal positioning

The wall bracket for the units must be attached with suitable screws and anchors.

6.2 Connecting the refrigerant piping

The refrigerant piping is connected (responsibility of the customer) on the back side of the units.

It may be necessary to fit a reducer or flared adapter to the indoor unit. These fittings are included with the indoor unit as an accessory kit. Once installed, the connections should be insulated to make them vapour diffusion proof.

! NOTICE!

Installation should only be performed by authorised specialists.

! NOTICE!

The unit is factory filled with dry nitrogen for leak testing purposes. The pressurised nitrogen is released when the union nuts are undone.

! NOTICE!

Use only tools which are approved for use in an HVAC environment. (z. B.: bending pliers, pipe/tubing cutters, de-burrers and flaring tools). Do not cut refrigerant pipes with a saw.

! NOTICE!

All work must be carried out in a way that prevents dirt, particles, water etc. from entering, refrigerant lines!

The following instructions describe the installation of the cooling cycle and the assembly of the indoor unit and the outdoor unit.

1. The required pipe diameters are given in the table "Technical data".
2. Install the indoor unit and connect the refrigerant piping as described in the operating manual for the indoor unit.
3. Use the wall or floor brackets to fit the outdoor unit against structural parts approved to support the static load (refer to the installation instructions for the brackets).
4. Ensure that structure-borne sound is not transferred to parts of the building. Use vibration dampers to reduce the effects of structure-borne sound!
5. Lay the refrigerant piping from the indoor unit to the outdoor unit. Ensure that the fastenings are adequate and if necessary, take appropriate oil return measures!
6. Remove the factory-fitted protective caps and union nuts on the connections. These should be used later in the installation process.
7. Before flanging the refrigerant piping, ensure that the union nut is fitted on the pipe.
8. Prepare the laid refrigerant pipings as shown below (Fig. 34 and Fig. 35).
9. Verify that the shape of the flange is correct (Fig. 36).
10. First connect and hand-tighten the refrigerant piping to ensure it is correctly seated.
11. Then tighten the fittings with 2 appropriately-sized open-ended spanners. Use one spanner to counter the force when tightening the fitting (Fig. 37).
12. Use insulation hoses which are designed for this temperature range and are diffusion proof.
13. Observe the permitted bending radius for the refrigerant piping during installation. Never bend a pipe twice in the same place. Brittleness and cracking can result.
14. Apply appropriate heat insulation to the installed refrigerant piping, including connector.
15. Take the same action at the shut-off valves for all subsequent refrigerant piping.

Label the refrigerant piping (injection and suction pipes) as well as the associated electrical control lines of each interior unit with a letter. Only connect the lines to their associated connections.

NOTICE!

Always pay attention to the affiliation of the electrical lines and refrigerant piping! The connections of the individual circuits must not be mixed up. Mixing up the assignment of control lines and refrigerant piping can have fatal consequences (compressor damage)!

Commissioning of the individual circuits must be carried out successively.

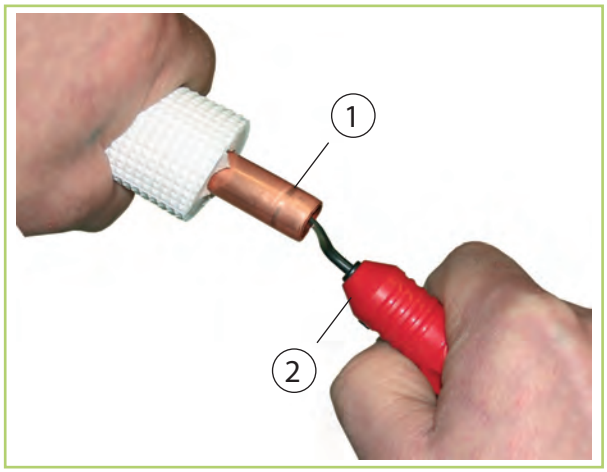

Fig. 34: Deburring the refrigerant piping

1: Refrigerant piping
2: Deburrer

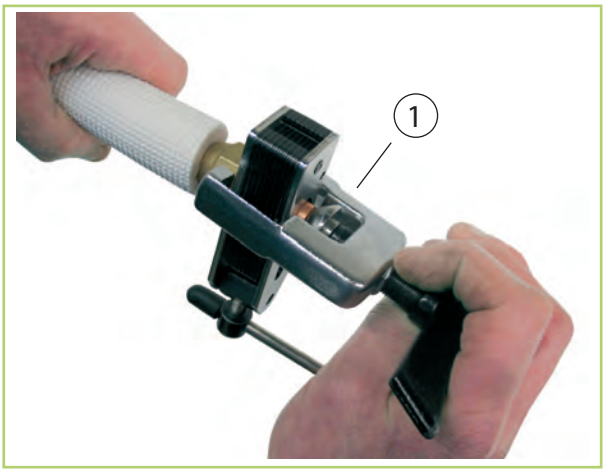

Fig. 35: Flanging the refrigerant piping

1: Flanging tool

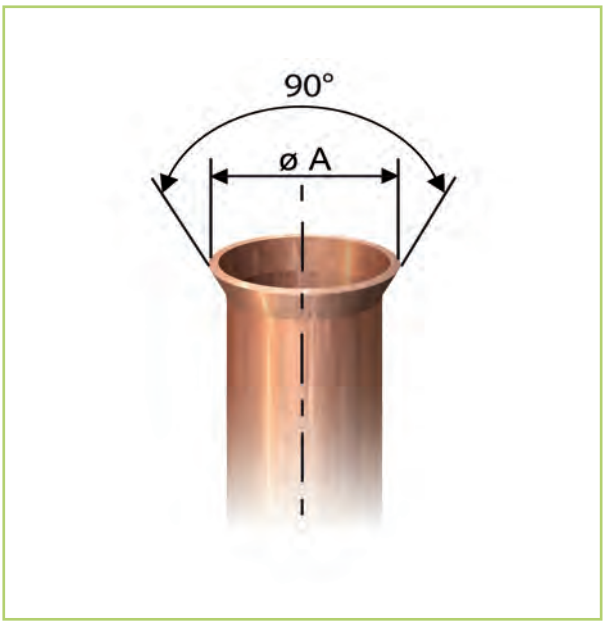

Fig. 36: Correct flange shape

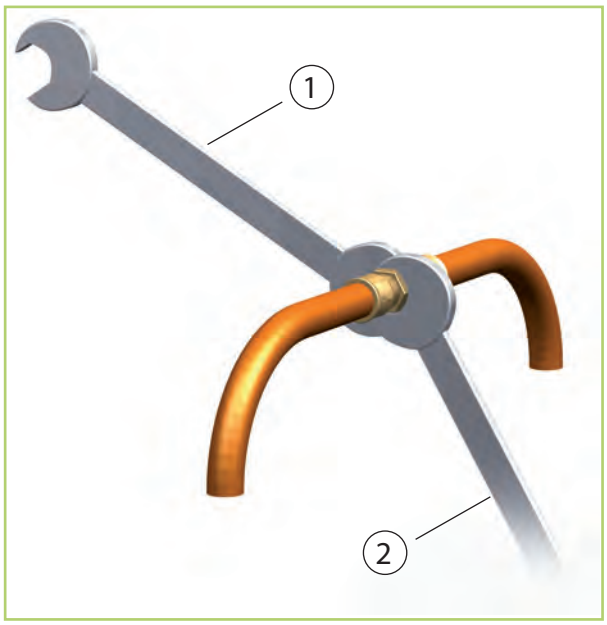

Fig. 37: Tightening the fitting

1: Tighten with the first open-ended spanner
2: Counter with the second open-ended spanner

Pipe dimension in inches	Tightening torque in Nm
1/4"	15-20
3/8"	33-40
1/2"	50-60
5/8"	65-75
3/4"	95-105

6.3 Additional notes on connecting the refrigerant piping

- When combining the outdoor unit with some indoor units, the procedure for connecting the refrigerant piping may differ. Install the provided reducer or expansion fittings to the indoor unit.
- If the basic length of the connecting line exceeds 5m, add refrigerant when commissioning the system for the first time (see chapter "Adding refrigerant").

6.4 Leak testing

Once all the connections have been made, the pressure gauge station is attached to the Schrader valve as follows (if fitted):

red = small valve = high pressure

blue = large valve = suction pressure

Once the connection has been made successfully, the leak test is carried out with dry nitrogen.

Leak testing involves spraying a leak detection spray onto the connections. If bubbles are visible, the connections have not been made properly. In that case, tighten the connection or, if necessary, create a new flange.

After completing a successful leak test, the excess pressure in the refrigerant piping is removed and a vacuum pump with an absolute final partial pressure of min. 10 mbar is used to remove all of the air and empty the pipes. Any moisture present in the pipes will also be removed.

! NOTICE!

A vacuum of at least 20 mbar must be produced!

The time required to generate the vacuum is dependent on the final pressure pipe volume of the indoor units and the length of the refrigerant piping. However, the process will take at least **60 minutes**. Once any foreign gases and humidity have been completely extracted from the system, the valves on the pressure gauge station are closed and the valves on the outdoor unit are opened as described in the "Commissioning" section.

6.5 Adding refrigerant

The units contain a basic quantity of refrigerant. In addition, an additional amount of refrigerant must be added for refrigerant piping lengths exceeding 5 metres per circuit. Refer to the following chart:

	Up to and incl. 5m	From 5m to max. length
ML 263 DC	0 g/m	30 g/m
ML 353 DC		
ML 523 DC		

⚠ CAUTION!

Wear protective clothing when handling refrigerant.

⚠ DANGER!

Only refrigerant in a liquid state may be used to fill the cooling cycle!

! NOTICE!

Check the overheating to determine the refrigerant fill quantity.

! NOTICE!

The escape of refrigerant contributes to climatic change. In the event of escape, refrigerant with a low greenhouse potential has a lesser impact on global warming than those with a high greenhouse potential. This device contains refrigerant with a greenhouse potential of 1975. That means the escape of 1 kg of this refrigerant has an effect on global warming that is 1975 times greater than 1 kg CO^2, based on 100 years. Do not conduct any work on the refrigerant circuit or dismantle the device - always enlist the help of qualified experts.

7 Condensate drainage connection and safe drainage

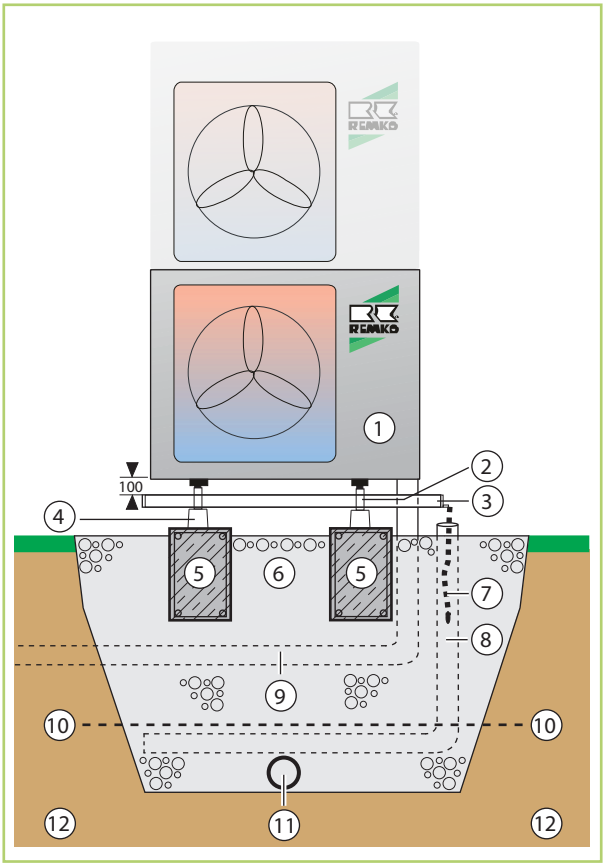

Fig. 38: Condensate drainage, seepage of condensate and strip foundation (cross-section)

1: Outdoor unit
2: Leg
3: Condensate collection tray
4: Floor bracket
5: Reinforced strip foundation HxWxD = 300x200x800mm
6: Gravel layer for seepage
7: Condensate drainage heating
8: Drainage channel
9: Conduit for refrigerant piping and electrical connecting line (temperature-resistant up to at least 60°C)
10: Frost line
11: Drainage pipe
12: Soil

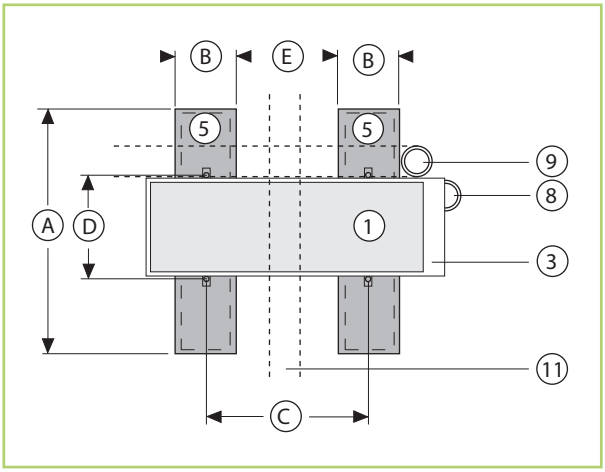

Fig. 39: Dimensions for the strip foundation (bird's eye view)

For the designations of 1,3,5,8,9 and 11, please refer to the legend for the Fig. 38

dimensioning of the strip foundation (in mm)

Dimension	ML 263 DC AT-523 DC AT
A	800
B	200
C	549
D	276
E	349

Condensate drainage connection

If the temperature falls below the dew point, condensation will form on the finned condenser during **heating mode.**

A condensate tray should be installed on the underside of the unit to drain any condensate.

- The condensate drainage line should have an incline of min. 2%. This is the responsibility of the customer. If necessary, fit vapour-diffusion-proof insulation.
- When operating the unit at outside temperatures below 4 °C, ensure the condensate drainage line is laid to protect it against frost. The lower part of the housing and condensate tray is also to be kept frost free in order to ensure permanent draining of the condensate. If necessary, fit a pipe heater.
- Following installation, check that the condensate run off is unobstructed and ensure that the line is durably leak tight.

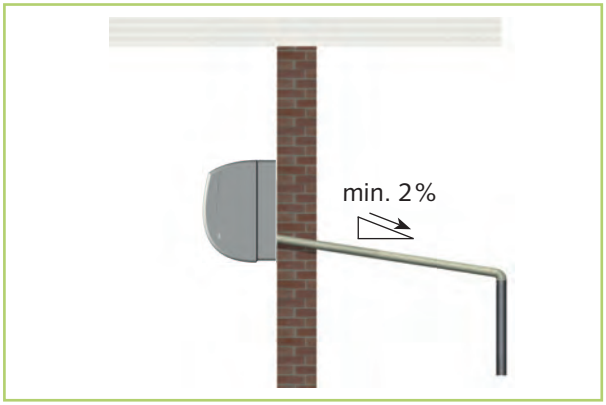

Fig. 40: Condensate drainage connection - Indoor unit

Safe drainage in the event of leakages

The REMKO oil separator OA 2.2 fulfils the following list of requirements from regional regulations and laws.

! NOTICE!

Local regulations or environmental laws, for example the German Water Resource Law (WHG), can require suitable precautions to protect against uncontrolled draining in case of leakage to provide for safe disposal of escaping refrigerator oil or hazardous media.

8 Electrical wiring

8.1 General Information

A protected power supply cable is to be connected to the outdoor unit and a five-wire control line to the indoor unit respectively.

DANGER!

All electrical installation work is to be performed by specialist companies. Disconnect the power supply when connecting the electrical terminals.

WARNING!

All electric lines are in accordance VDE regulations to dimension and to lay.

NOTICE!

The electrical connection for the units must be made at a separate feedpoint with a residual current device in accordance with local regulations and should be laid out by an electrician.

We recommend using shielded wires for the control lines.

Check all plugged and clamped terminals to verify that they are seated correctly and make permanent contact. Tighten as required.

8.2 Connecting the indoor unit

- We recommend that a mains/repair switch be installed near the outdoor unit.
- The terminal blocks for making the connections are located at the rear of the unit. When the unit is installed, measurements can be made from the front by removing the cover.
- If an optional condensate pump is used as an accessory in conjunction with the unit, it may be necessary to install an additional relay with a higher contact rating after the switch-off contact on the pump to switch off the compressor.

Make the connection as follows:

1. Open the air inlet grill.
2. Remove the covers on the right-hand side (Fig. 41).
3. Connect the customer-laid control line to the terminals (Fig. 41).
4. Re-assemble the unit.

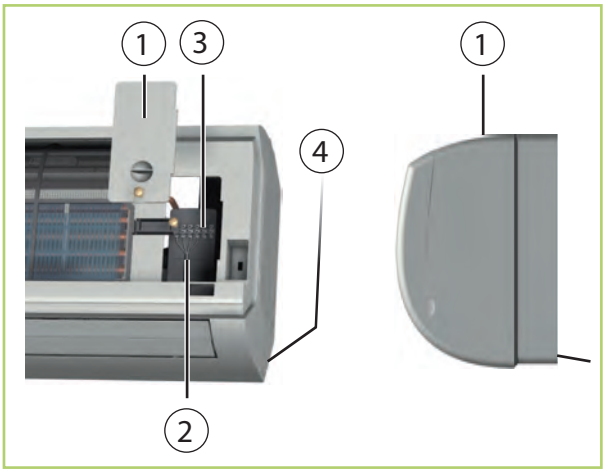

Fig. 41: Connecting the indoor unit

1: Cover
2: Strain relief
3: Terminal block for control line
4: Control line from outdoor unit

8.3 Connecting the outdoor unit

Proceed as follows to connect the line:

1. Remove the side-panel cover.
2. Choose a cable-section according to the relevant specifications.
3. Connect the lines as shown on the electrical connection diagram.
4. Fix the line in the strain relief and re-assemble the unit.

Fig. 42: Connecting the outdoor unit

8.4 Electrical wiring diagram

Connection ML 263 DC-523 DC

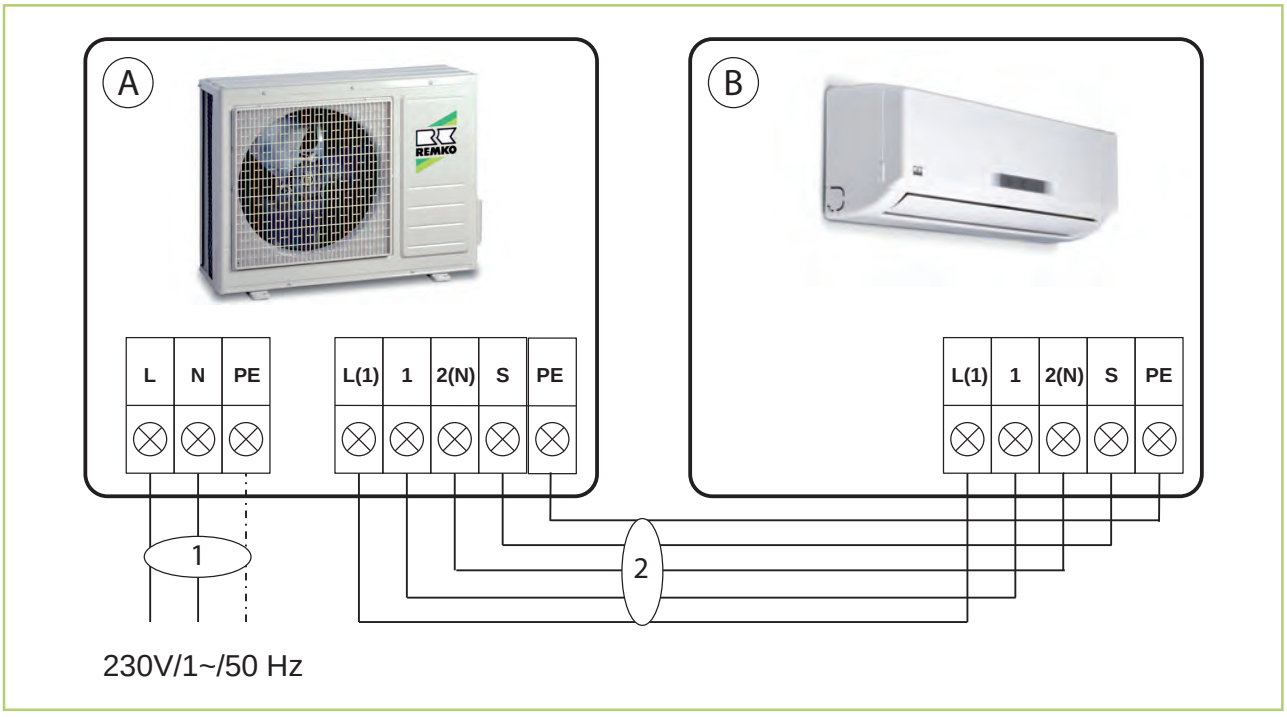

Fig. 43: Electrical wiring diagram

A: Outdoor unit ML 263 DC AT-523 DC AT
B: Indoor unit ML 263 DC IT-523 DC IT

1: Power supply
2: Communication line

Connecting of optional condensate pump KP 6 / KP 8

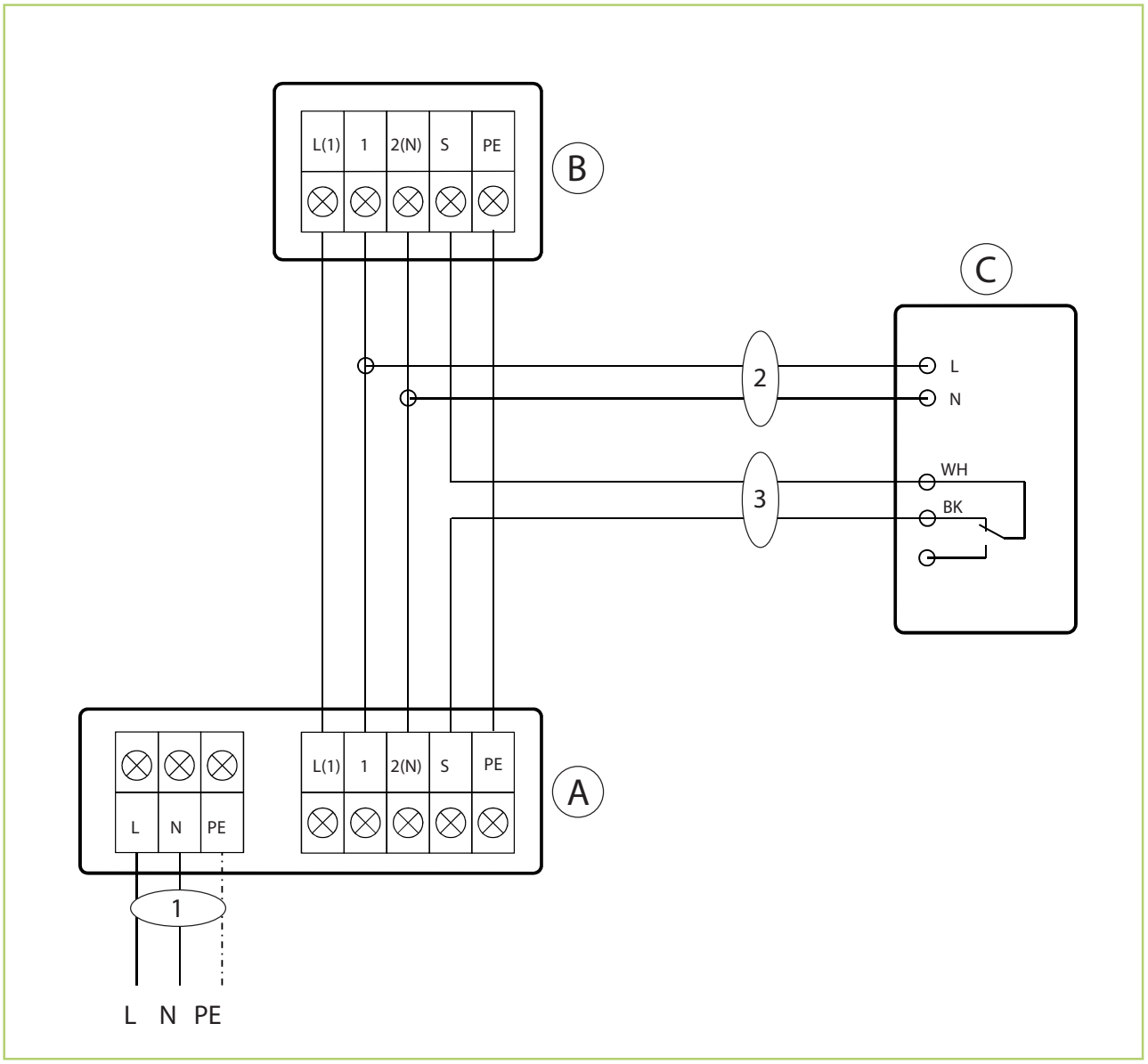

Fig. 44: Electrical wiring diagram

A: Outdoor unit
B: Indoor unit
C: Condensate pump KP 6 / KP 8
1: Power supply
2: Supply condensate pump
3: Fault contact condensate pump
BK: black
WH: white

8.5 Electrical drawings

Indoor unit ML 263 DC IT

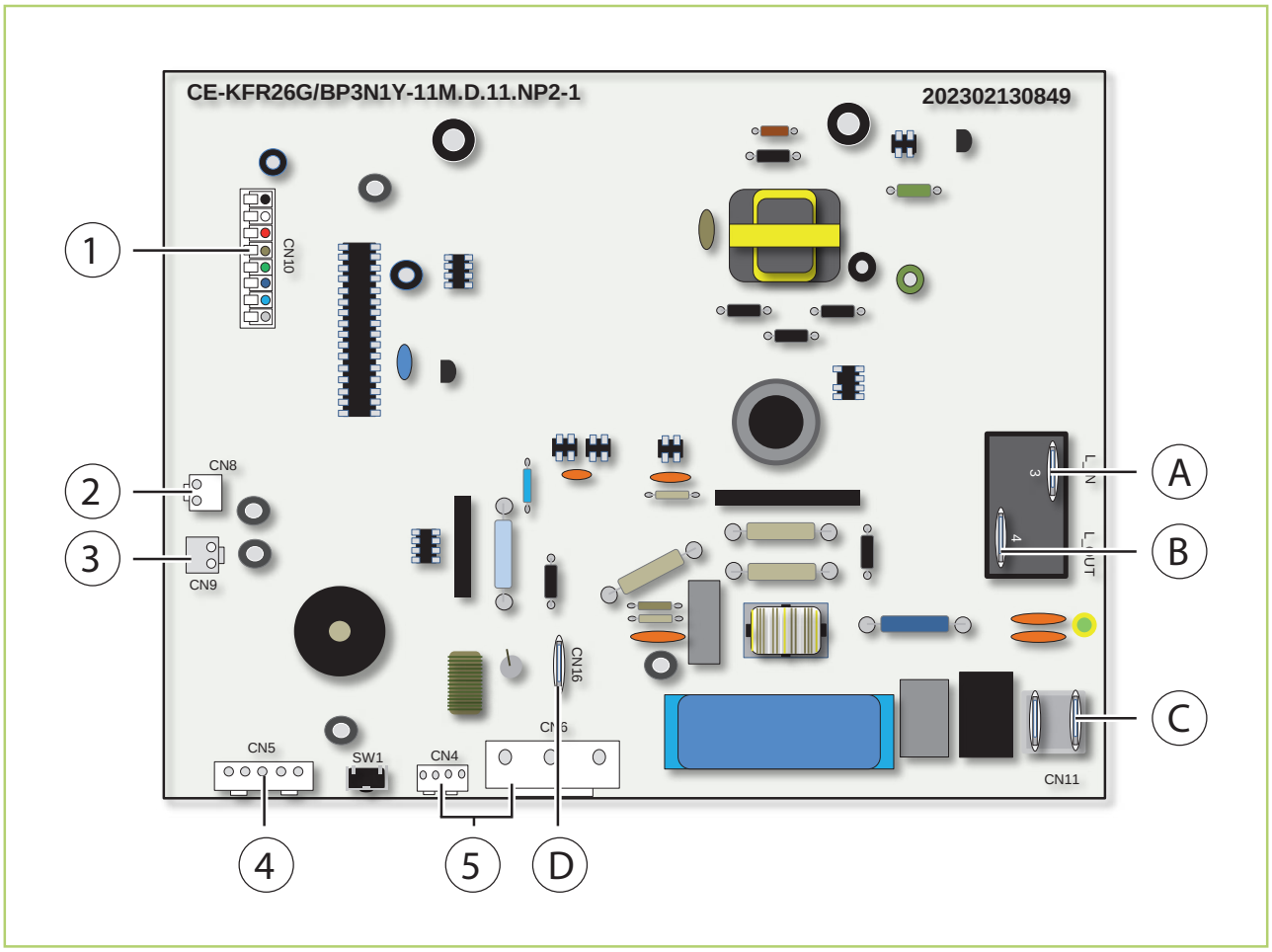

Fig. 45: Electrical drawings

A: Connection to terminal block, power supply and supply to the indoor unit (contact 1)
B: Connection to terminal block, power supply and supply to the indoor unit (contact L (1))
C: Connection to terminal block, power supply and supply to the indoor unit (contact 2 (N))
D: Connection to terminal block, power supply and supply to the indoor unit (contact S)

1: Display
2: Probe air inlet
3: Probe suction pipe
4: Swing motor
5: Evaporator fan motor / Evaporator fan board

Indoor unit ML 353 DC IT

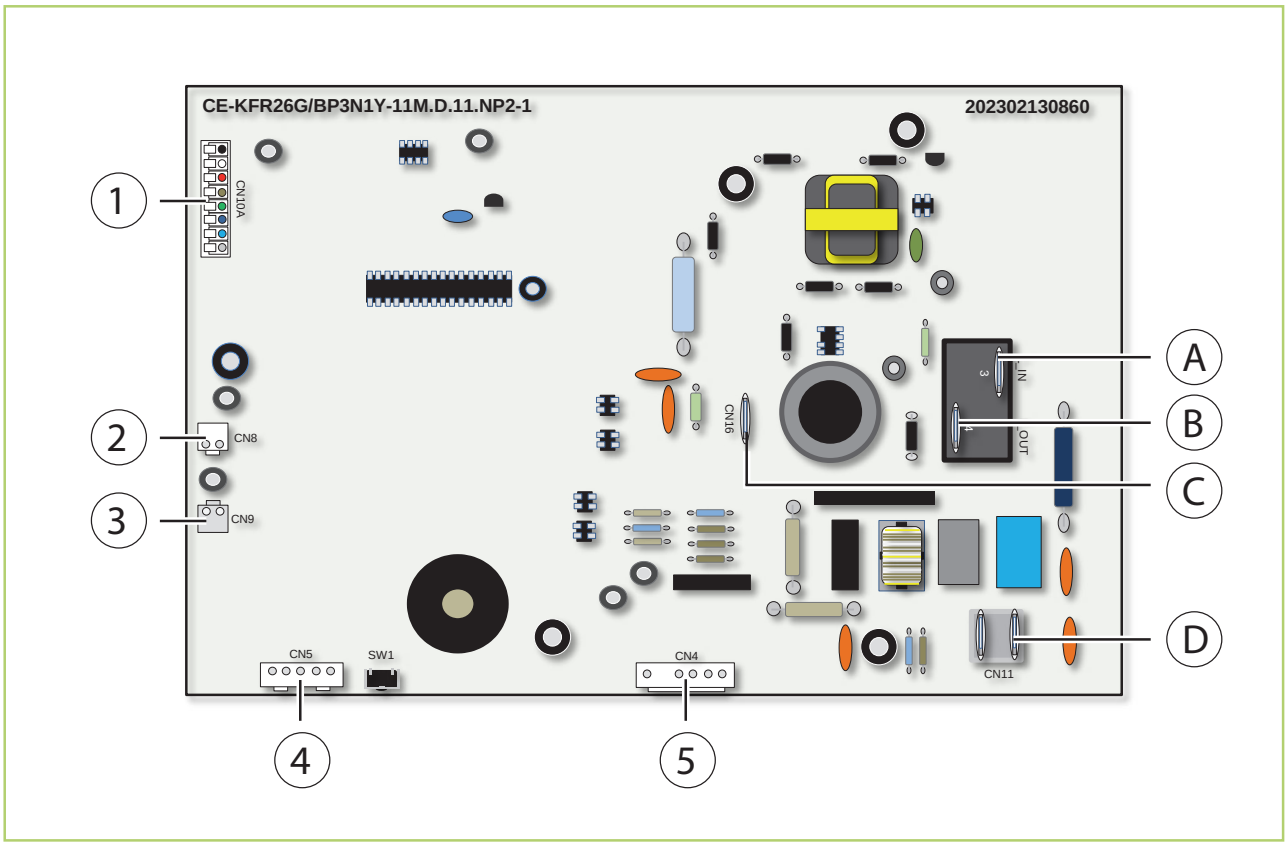

Fig. 46: Electrical drawings

A: Connection to terminal block, power supply and supply to the indoor unit (contact 1)
B: Connection to terminal block, power supply and supply to the indoor unit (contact L (1))
C: Connection to terminal block, power supply and supply to the indoor unit (contact S)
D: Connection to terminal block, power supply and supply to the indoor unit (contact 2 (N))

1: Display
2: Probe air inlet
3: Probe suction pipe
4: Swing motor
5: Evaporator fan motor

Indoor unit ML 523 DC IT

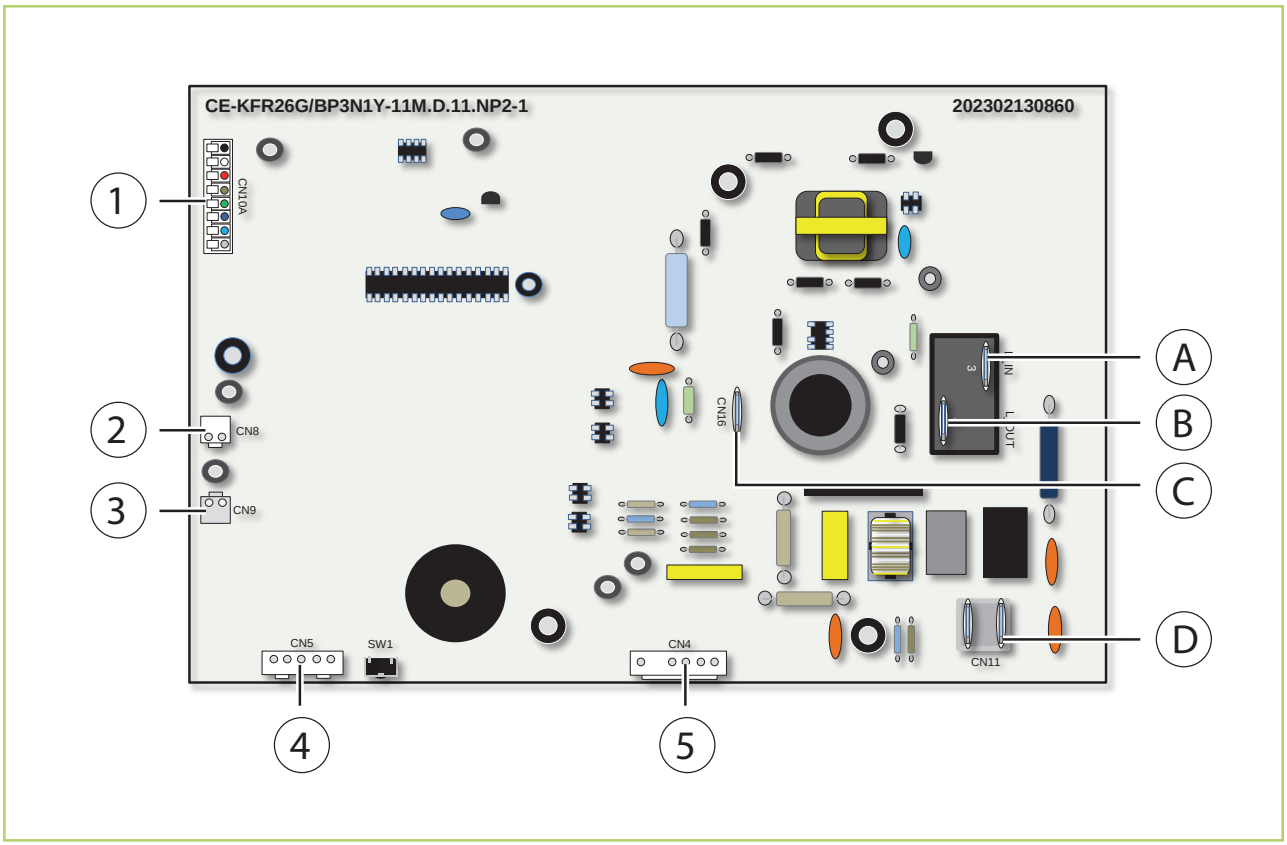

Fig. 47: Electrical drawings

A: Connection to terminal block, power supply and supply to the indoor unit (contact 1)
B: Connection to terminal block, power supply and supply to the indoor unit (contact L (1))
C: Connection to terminal block, power supply and supply to the indoor unit (contact S)
D: Connection to terminal block, power supply and supply to the indoor unit (contact 2 (N))

1: Display
2: Probe air inlet
3: Probe suction pipe
4: Swing motor
5: Evaporator fan motor

Outdoor unit ML 263 DC AT

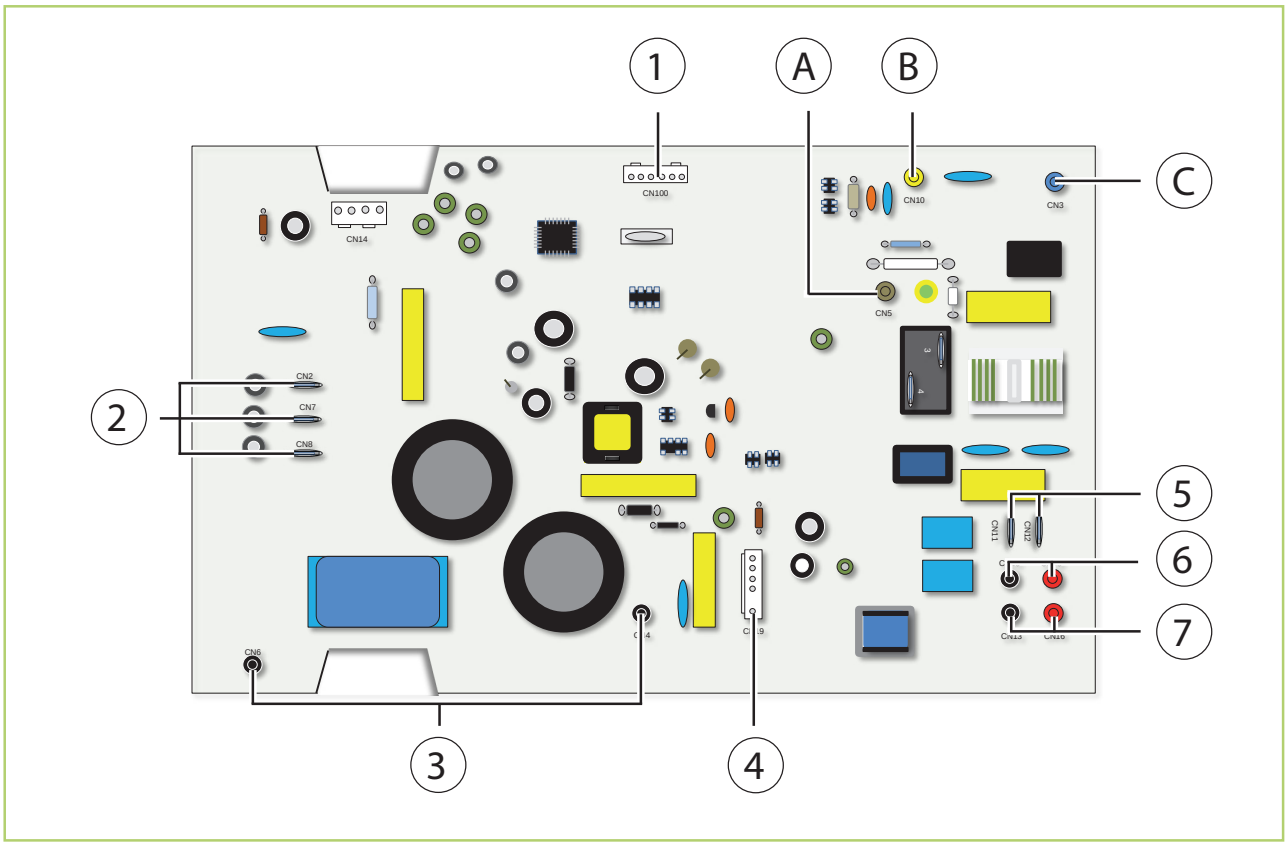

Fig. 48: Electrical drawings

A: Connection to terminal block, indoor unit (contact L(1))
B: Connection to terminal block, supply (contact S)
C: Connection to terminal block, supply and indoor unit (contact N und 2(N))
1: Probe heat gas , probe outside air, probe condenser outlet
2: Compressor
3: Inductor
4: Condenser fan
5: 4-way valve
6: Heater 1 (optional)
7: Heater 2 (optional)

Outdoor unit ML 353 DC AT

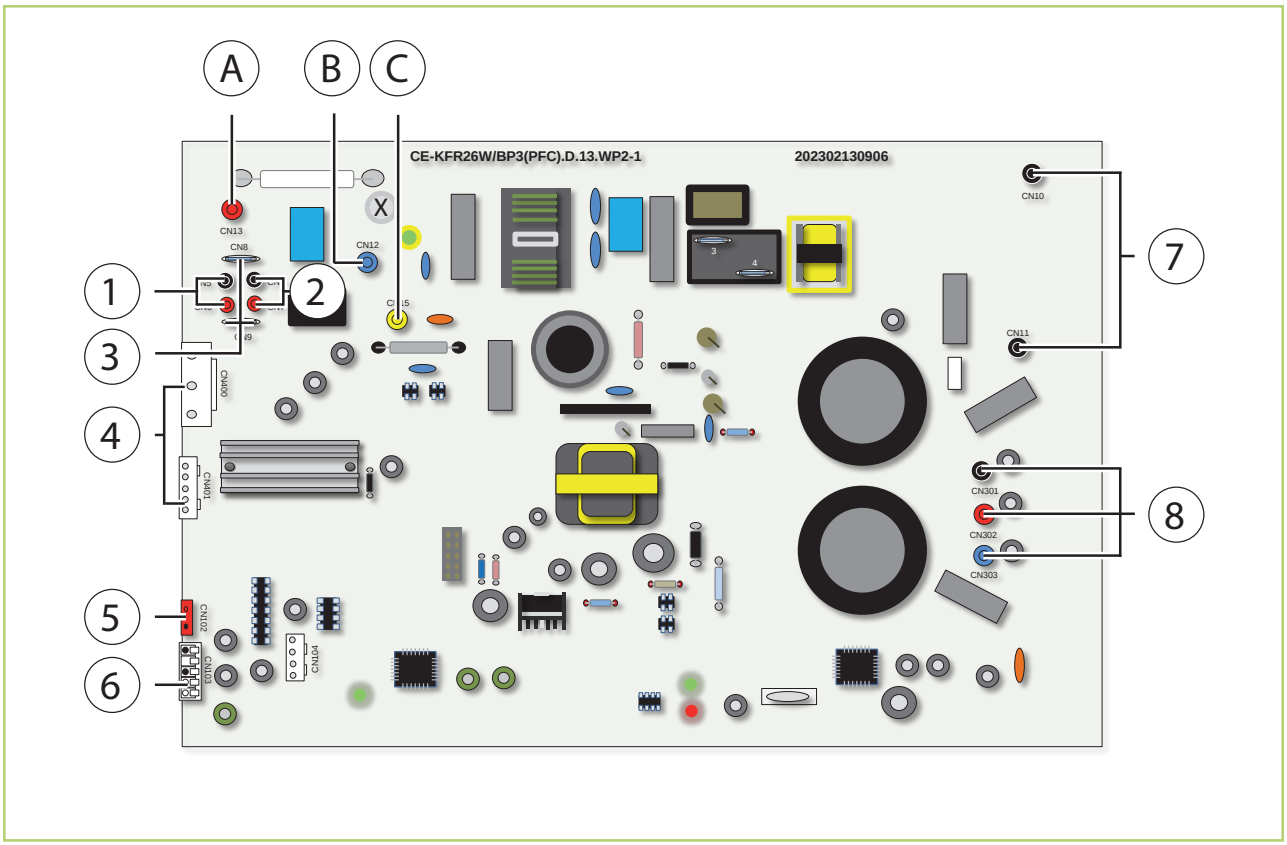

Fig. 49: Electrical drawings

A: Connection to terminal block, power supply and supply to the indoor unit (contact L (1))
B: Connection to terminal block, power supply and supply to the indoor unit (contact N und 2(N))
C: Connection to terminal block, power supply and supply to the indoor unit (contact S)
1: Heater 2 (optional)
2: Heater 1 (optional)
3: 4-way valve
4: Condenser fan
5: Probe heat gas
6: Probe outside air, probe condenser
7: Inductor
8: Compressor

Outdoor unit ML 523 DC AT

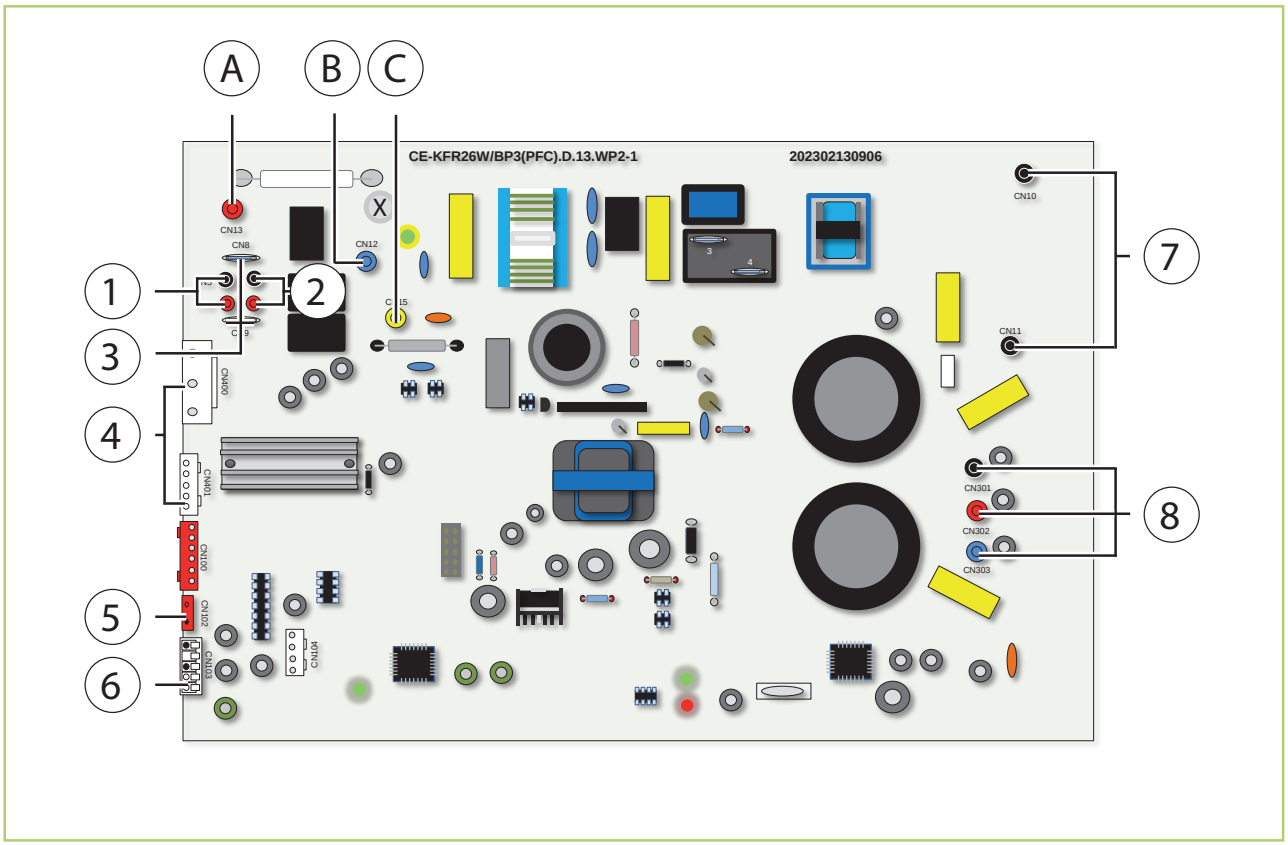

Fig. 50: Electrical drawings

A: Connection to terminal block, power supply and supply to the indoor unit (contact L (1))
B: Connection to terminal block, power supply and supply to the indoor unit (contact N und 2(N))
C: Connection to terminal block, power supply and supply to the indoor unit (contact S)
1: Heater 2 (optional)
2: Heater 1 (optional)
3: 4-way valve
4: Condenser fan
5: Probe heat gas
6: Probe outside air, probe condenser
7: Inductor
8: Compressor

9 Before commissioning

After leak testing has been successfully completed, connect the vacuum pump via the pressure gauge station to the valve connections on the outdoor unit (see chapter "Leak testing") and create a vacuum.

Perform the following checks prior to putting the unit into operation for the first time and after any work on the cooling cycle. Record the results in the commissioning report:

- Check all refrigerant piping and valves for leak-tightness using leak detection spray or soapy water.
- Check the refrigerant piping and insulation for damage.
- Check the electrical connection between the indoor unit and the outdoor unit for correct polarity.
- Check that all fastenings, mountings, etc. are firm and at the correct level.

10 Commissioning

! NOTICE!

Commissioning should only be performed by specially trained personnel and documented after the certificate has been issued. Observe the operating manuals for the indoor unit and outdoor unit when commissioning the entire system.

Once all the components have been connected and tested, the system can be put into operation. A functional check should be performed to verify its correct function and identify any unusual operating behaviour prior to handing it over to the operator.

! NOTICE!

Check that the shut-off valves and valve caps are tight after carrying out any work on the cooling cycle. Use appropriate sealant products as necessary.

Functional checks and test run

Check the following points:

- Leak-tightness of the refrigerant piping.
- Compressor and fan running smoothly.
- In cooling mode, cold air output by the indoor unit, and warm air output by the outdoor unit.
- Function test of the indoor unit and all program sequences.
- Check of the surface temperature of the suction pipe and that the vaporiser is not overheating. To measure the temperature, hold the thermometer to the suction pipe and subtract the boiling point temperature reading on the pressure gauge from the measured temperature.
- Record the measured temperatures in the commissioning report.

Function test of the cooling and heating modes

1. Remove the protective caps from the valves.
2. Start the commissioning procedure by briefly opening the shut-off valves on the outdoor unit until the pressure gauge indicates a pressure of approx. 2 bar.
3. Check all connections for leaks with leak detection spray and suitable leak detectors.
4. If no leaks are found, fully open the shut-off valves by turning them anti-clockwise using a spanner. If leaks are found, remedy the faulty connection. It is imperative that the vacuum creation and drying steps are repeated.
5. Activate the main circuit breaker or fuse (to be provided by the customer).
6. Press the test knob on the outdoor unit and wait until a frequency of min. 50 Hz is established.
7. Use the remote control to switch on the unit and select the cooling mode, maximum fan speed and lowest target temperature.
8. Check the overheating, outside, inside, outlet and vaporisation temperatures and record the measured values in the commissioning report. Check the correct function and settings of all regulation, control and safety devices.
9. Check the unit control system using the functions described in the chapter "Operation". Timer, temperature setting, fan speeds and switching to ventilation or dehumidification mode.
10. Check the correct function of the condensate drainage by pouring distilled water into the condensate tray. A bottle with a spout is recommended for pouring the water into the condensation tray.
11. Switch the indoor unit to heating mode.
12. During the test run, check the functionality of all of the previously described safety devices.
13. Record the measured values into the commissioning report and familiarise the operator with the system.
14. Remove the pressure gauge. Check that seals have been fitted in the sealing caps.
15. Re-install all disassembled parts.

11 Troubleshooting, fault analysis and customer service

11.1 Troubleshooting and customer service

The unit and components are manufactured using state-of-the-art production methods and tested several times to verify their correct function. However, if alarms should occur, please check the functions as detailed in the list below. For systems with an indoor unit and outdoor unit, refer to the chapter "Troubleshooting and customer service" in both operating manuals. Please inform your dealer if the unit is still not working correctly after all function checks have been performed!

Operational malfunctions

Malfunction	Possible causes	Checks	Remedial measures
The unit does not start or switches itself off.	Power failure, under-voltage, defective mains fuse / main switch in OFF position	Does all other electrical equipment function correctly?	Check the voltage and if necessary, wait for it to come back on.
	Damaged power supply	Does all other elec. equipment function correctly?	Repair by specialist firm
	Wait time after switching on is too short	Have approx. 5 minutes elapsed since the restart?	Schedule longer wait times
	Temperature outside operating range.	Are the fans in the indoor unit and outdoor unit working correctly?	Observe temperature ranges of indoor unit and outdoor unit
	Electrical surges caused by thunderstorms	Have there been lightning strikes in the area recently?	Switch off the mains breaker and switch it back on. Have it inspected by a specialist
	Malfunction of the external condensate pump	Has the pump shut down due to a malfunction?	Check and if necessary clean the pump
	High-pressure / low-pressure switches have triggered	Check refrigerant pressure and look for leaks if necessary	Rectify leakage and restart
The unit does not respond to the remote control	Transmission distance too far / receiver affected by interference	Does the indoor unit beep when pressing a key?	Reduce the distance to less than 6 m or change position
	Defective remote control	Is the unit running in manual mode?	Replace the remote control
	Receiver or transmitter unit exposed to excessive solar radiation	Does it function correctly in the shade?	Place the receiver and/or transmitter unit in the shade
	Electromagnetic fields are interfering with transmission	Does it function after removing potential sources of interference?	Signal is not transmitted when interference sources are operational
	Key in remote control jammed / two buttons pressed at same time	Does the “Transmitting” symbol appear on the display?	Release the key / only press one key
	Batteries in remote control are flat	Have new batteries been inserted? Is the display incomplete?	Insert new batteries

Malfunction	Possible causes	Checks	Remedial measures
The unit is running but only provides reduced or no cooling or heating capacity.	Filter is dirty / air inlet / outlet opening is blocked by debris.	Have the filters been cleaned?	Clean the filters
	Windows and doors open. Heating / cooling load has increased	Have structural / usage modifications been made?	Close windows and doors / install additional units
	Neither cooling nor heating mode has been set	Does the cooling symbol appear on the display?	Correct the settings for the unit
	Fins on outdoor unit blocked by foreign objects	Does the fan of the outdoor unit work? Are the exchanger fins unobstructed?	Check the fan or winter fan speed control, reduce the air resistance
	Leaking cooling cycle	Are there signs of frost on the exchanger fins of the indoor unit?	Repair by specialist
	Outdoor unit iced up	Check outdoor unit. Has the cassette probe on the outdoor unit been correctly positioned?	De-ice and fit the probe at the point where the most ice forms
Condensate discharge on unit	Drainage pipe on collection container clogged / damaged	Can the condensate drain off without any obstruction?	Clean the drainage pipe and collection container
	Faulty external condensate pump or float	Is the collection tray full of water and the pump not running?	Call out a specialist to replace the pump
	Condensate has not drained away and has collected in the condensate drainage line	Is there an incline on the condensate drainage line? Check there is no blockage in the pipe.	Ensure there is an incline when laying the condensate drainage line and clean the pipe.
	Condensate does not drain off	Are the condensate drainage lines unblocked and is there a steady incline? Are the condensate pump and liquid level switch functioning correctly?	Route the condensate drainage line with an incline and clean it. If the liquid level switch or the condensate pump is defective, have them replaced.
	Float is stuck or jammed due to excessive dirt.	Are the LEDs on the receiver unit of the indoor unit flashing?	Should be cleaned by specialist firm

Fault indicated on indoor unit

Display	Cause	Required action
E0	EEPROM error	Contact specialist dealer
E1	Communication fault between outdoor unit and indoor unit	Disconnect from mains for 2 min, check electrical wiring
E2	Wiring fault L/N/Pe/S	Check wiring, replace IT circuit board
E3	Defective speed monitoring, evaporator fan	Check wiring, check motor voltage
E4	Evaporator inlet temperature probe defective / short-circuited	Check wiring, contact specialist company
E5	Evaporator suction pipe probe defective / short-circuited	Check wiring, contact specialist company
EC	Refrigerant loss / leak	Check refrigerant pressure, check system for leaks
F1	Outside temperature probe defective / short-circuited	Check wiring, contact specialist company
F2	Condenser probe defective / short-circuited	Check wiring, contact specialist company
F3	Heat gas line probe defective / short-circuited	Check wiring, contact specialist company
F4	EEPROM fault, outdoor unit	Contact specialist dealer
F5	Defective speed monitoring, condenser fan	Check wiring, check motor voltage
P0	IPM power board safety shutdown	Check wiring, switch off and on again, contact specialist company
P1	Overvoltage/undervoltage protection	Check voltage on the L/N/S system. Switch system off and on again
P4	Inverter board fault	Switch system off and on again, replace inverter board

11.2 Indoor unit fault analysis

Fault E0: EEPROM error

Switch the unit off for 5 seconds. Is the fault still shown on the display?		
↓YES		
Is the EEPROM chip properly seated on the circuit board?	NO →	Insert the chip properly.
↓YES		
Replace the indoor unit circuit board.		

Fault E1: Communication error between outdoor and indoor unit

Switch the unit off for 5 seconds. Is the fault still shown on the display?		
↓YES		
Check all connecting lines between the indoor unit and the outdoor unit and check that the connections to the circuit boards comply with the circuit diagram. Are all cables properly connected?		
↓YES		
Measure the voltage on the S and N terminals of the outdoor unit. Is +24 V present on these?	NO →	Has the wiring to the indoor unit been correctly implemented?
↓YES		↓YES
Has the wiring to the outdoor unit been correctly implemented?		Replace the indoor unit control board.
↓YES		
Replace the outdoor unit motherboard.	← NO	Has the fault cleared?

Fault E2: Phase monitoring has tripped

Is all cabling correctly connected and is the supply voltage present at the outdoor unit?	NO →	Renew all electrical connections if necessary.
↓YES		
The indoor unit control board is defective. Please replace.		

Fault E3: Fan speed incorrect

Switch the unit off for 5 seconds. Is the fault still shown on the display?	NO →			The unit operates normally.	
↓YES					
Switch the unit off. Check whether the fan rotor can be turned easily by hand.	NO →			Check the bearing between the fan rotor and the fan motor. Is it OK?	
↓YES				↓YES	↓NO
Check all electrical connections to the motor. Are these correctly implemented?	NO →	Replace the connections.		Replace the fan motor	Replace the bearing.
↓YES					
Check the resistance of the motor. Is this normal?	NO →	Replace the fan motor			
↓YES					
The indoor unit control board is defective. Please replace.					

Faults E3-E4 and F1-F3: Probe fault

Check the connection of the respective probe to the circuit board. Are these correctly implemented?	NO →	Establish a proper connection.
↓YES		
Measure the resistance of the respective probe. Use the table for comparison. Does the probe resistance match the value in the table?	NO →	Probe defective. Please replace.
↓YES		
Replace the respective control board.		

Fault EC: No cooling performance or heating performance after 30 minutes

Switch the unit off for 5 seconds. Is the fault still shown on the display?		
↓ YES		
Is the indoor unit blowing out cold air or warm air?	YES →	Check the probe on the evaporator (T2). Is this correctly seated?
↓ NO		↓ YES
Check all pipe connections for leak-tightness. Is there a deficit of refrigerant?		Replace the indoor unit circuit board.
	YES →	Rectify the leak and fill with new refrigerant.
↓ NO		
Are the pipelines kinked or perhaps contaminated?		
↓ YES		
Replace the pipelines.		

Fault P0: Inverter module fault

Check the electrical wiring between the circuit board and the compressor. Is this correctly implemented?	NO →	Replace the connections.
↓ YES		
Check whether the IPM module is correctly installed.	NO →	Correct the installation and retighten all screwed connections.
↓ YES		
Does the condenser fan run properly?	NO →	Check the connection of the condenser fan motor or replace it if necessary.
↓ YES		
Replace the outdoor unit motherboard. Is the fault still present?		
↓ YES		
Replace the compressor.		

Fault P1: Overvoltage/undervoltage protection AT tripped

Check whether the power supply is present and correct. Is this normal?	NO →	Switch the supply and try again as soon as this is normal again.
↓YES		
Check all electrical connections. Are they OK?	NO →	Correct the electrical connections.
↓YES		
Check the voltage between the P and N terminals of the outdoor unit. This should be approx. 320V DC. Is this voltage present?		
↓YES		
Replace the outdoor unit motherboard.		

Fault P2: Excessive temperature at the compressor

Check the indoor unit and outdoor unit heat exchangers for cleanliness. Is the air exchange guaranteed?	NO →	Clean the respective heat exchanger.
↓YES		
Switch the unit off for 10 minutes. Check whether the unit starts up again normally.	NO →	Check all electrical connections and the heat gas probe T5.
↓YES		
Check the fill level of the refrigerant. Is this correct?	NO →	Check the unit for leaks and fill with new refrigerant.
↓YES		
Refrigerant cannot circulate. Possibly due to internal contamination or kinked lines.		

Fault P3: Overcurrent protection on the compressor

Check all electrical connections. Are these correctly implemented?	NO →	Replace the connections.
↓YES		
Check the compressor windings. Are they OK?		
↓NO		
Replace the compressor.		

Resistance values for probes T1, T2, T3 and T4

Temperature (°C)	5	10	15	20	25	30	40	50	60
Resistance value (kΩ)	26.9	20.7	16.1	12.6	10.0	8.0	5.2	3.5	2.4

Resistance values for probe T5

Temperature (°C)	5	15	25	35	60	70	80	90	100
Resistance value (kΩ)	141.6	88	56.1	36.6	13.8	9.7	6.9	5.0	3.7

Progression - temperature / resistance

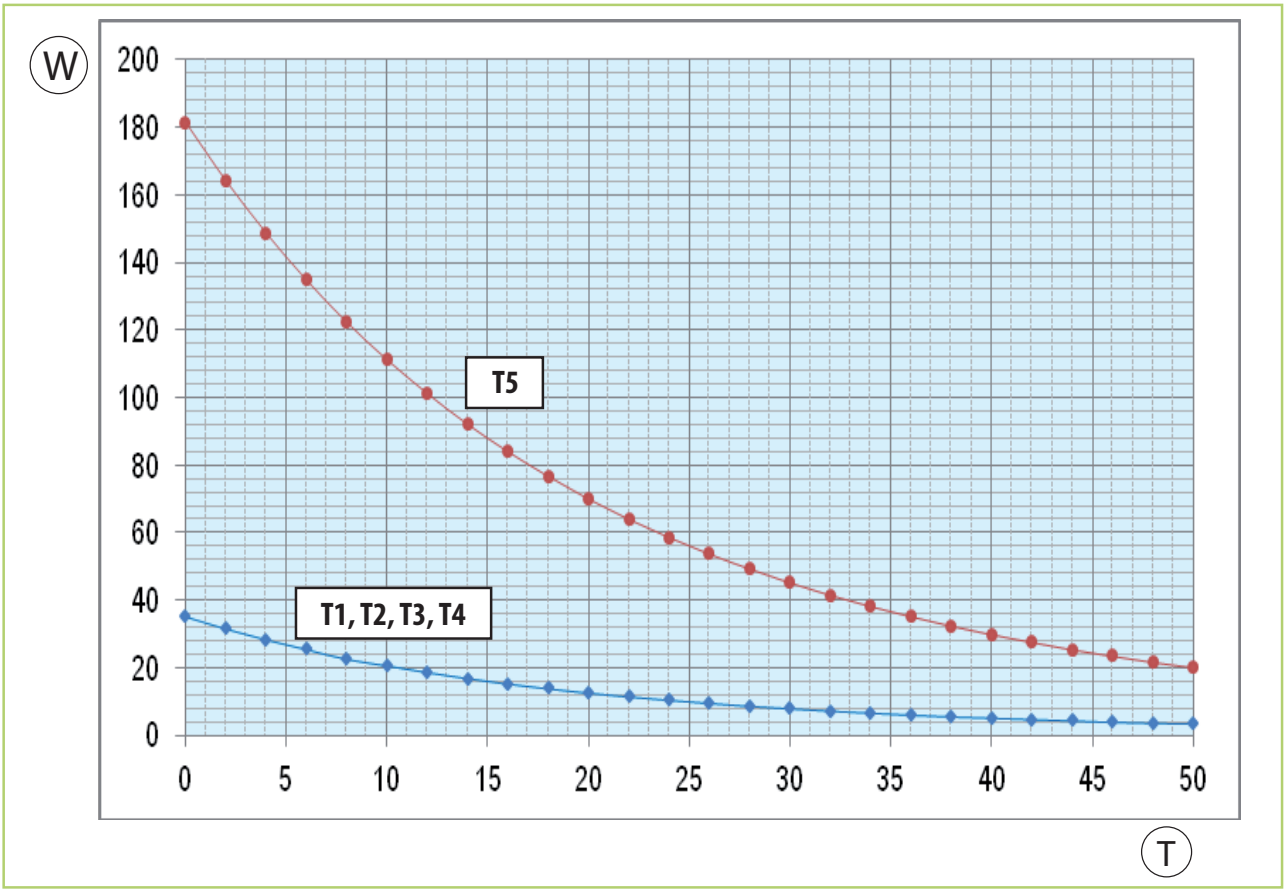

Fig. 51: Progression - temperature / resistance

W: Resistance (kΩ) T: Temperature (°C)

12 Care and maintenance

Regular care and observation of some basic points will ensure trouble-free operation and a long service life.

DANGER!

Prior to performing any work, ensure the equipment is disconnected from the voltage supply and secured to prevent accidental switch-on!

Care

- Ensure the unit is protected against dirt, mould and other deposits.
- Only clean the unit using a damp cloth. Do not use any caustic, abrasive or solvent-based cleaning products. Do not use a jet of water.
- Clean the fins on the unit prior to long shut-down periods.

Maintenance

- It is recommended that you take out a maintenance contract with an annual service from an appropriate specialist firm.

This enables you to ensure the operational reliability of the plant at all times!

NOTICE!

Statutory regulations require an annual leak test for the cooling cycle dependant on the refrigerant quantity. Inspection and documentation of the work performed is to be carried out by specialist technicians.

Type of task Checks/maintenance/inspection	Commissioning	Monthly	Every 6 months	Yearly
General	●			●
Check voltage and current	●			●
Check function of compressor/fans	●			●
Dirt on condenser/evaporator	●	●		
Check refrigerant fill quantity	●		●	
Check condensate drainage	●		●	
Check insulation	●			●
Check moving parts	●			●
Sealing test for cooling cycle	●			●[1)]

[1)] See note

Cleaning the housing

1. Disconnect the power supply to the unit.
2. Open and fold the air inlet grill on the front side upwards.
3. Clean the grill and cover with a soft, damp cloth.
4. Switch the power supply back on.

Air filter for indoor unit

Clean the air filter at intervals of no more than 2 weeks. Reduce this interval if the air is especially dirty.

Cleaning the filter

1. Disconnect the power supply to the unit.
2. Open the front side of the unit by folding the grill upwards and allowing it to engage (Fig. 52).
3. Raise the filter and pull it out in a downwards direction (Fig. 52).
4. Clean the filter with a commercially available vacuum cleaner (Fig. 53). To do so, turn the dirty side so it is facing upwards.
5. Dirt can also be removed by carefully cleaning with lukewarm water and mild cleaning agents (Fig. 54). The dirty side should be face down.
6. If water is used, let the filter dry out properly in the air before fitting it back into the unit.
7. Carefully insert the filter. Ensure that it locates correctly.
8. Close the front side as described above in reverse order.
9. Switch the power supply back on.
10. Switch the unit back on.

Cleaning the condensate pump (accessories)

The indoor unit may contain an optional integrated or separate condensate pump, which pumps out any accumulated condensate into higher positioned drains.

Observe the care and maintenance instructions in the separate operating manual.

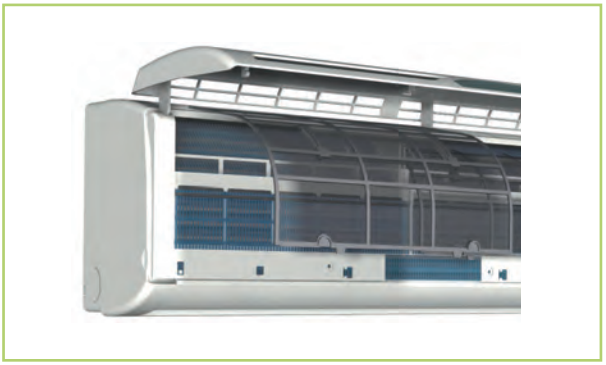

Fig. 52: Folding the grill upwards

Fig. 53: Cleaning with a vacuum cleaner

Fig. 54: Cleaning with lukewarm water

13 Shutdown

Temporary shutdown

1. Let the indoor unit run for 2 to 3 hours in recirculation mode, or in cooling mode at maximum temperature, to extract any residual humidity from the unit.
2. Shut down the system using the remote control.
3. Switch off the electrical power supply to the unit.
4. Cover the unit as far as possible with plastic foil in order to protect it from the influences of weather.

Permanent shutdown

Ensure that units and components are disposed of in accordance with local regulations, e.g. through authorised disposal and recycling specialists or at collection points.

REMKO GmbH & Co. KG or your contractual partner will be pleased to provide a list of certified firms in your area.

14 Exploded view and spare parts lists

14.1 Exploded view - Indoor unit

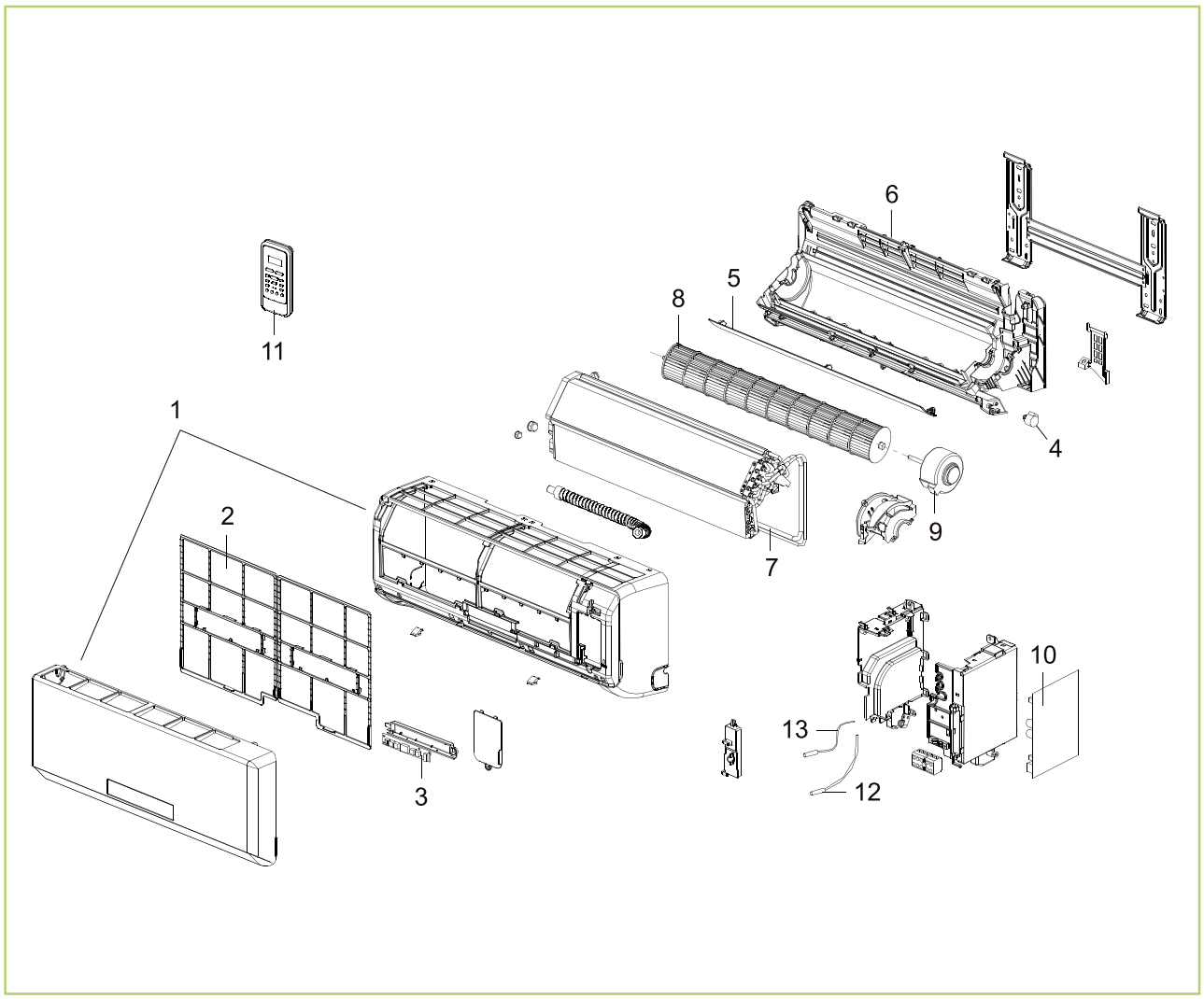

Fig. 55: Exploded view of the unit ML 263 DC IT-523 DC IT

We reserve the right to modify the dimensions and design as part of the ongoing technical development process.

14.2 Spare parts list - Indoor unit

Please contact REMKO GmbH & Co. KG directly to order spare parts. All of the spare parts numbers for your unit can be found in the download area at www.remko.de.

No.	Designation	ML 263 DC IT	ML 353 DC IT	ML 523 DC IT
1	Front panel, complete	On request by providing the serial number		
2	Air filter, set			
3	Circuit board, display			
4	Swing motor			
5	Air exhaust fins, set			
6	Condensate tray			
7	Evaporator			
8	Fan wheel			
9	Fan motor			
10	Control board			
11	IR remote control			
12	Ambient air probe			
13	Evaporator probe			

To ensure the correct delivery of spare parts, please always the device type with the corresponding serial number (see type plate)

14.3 Exploded view - Outdoor unit

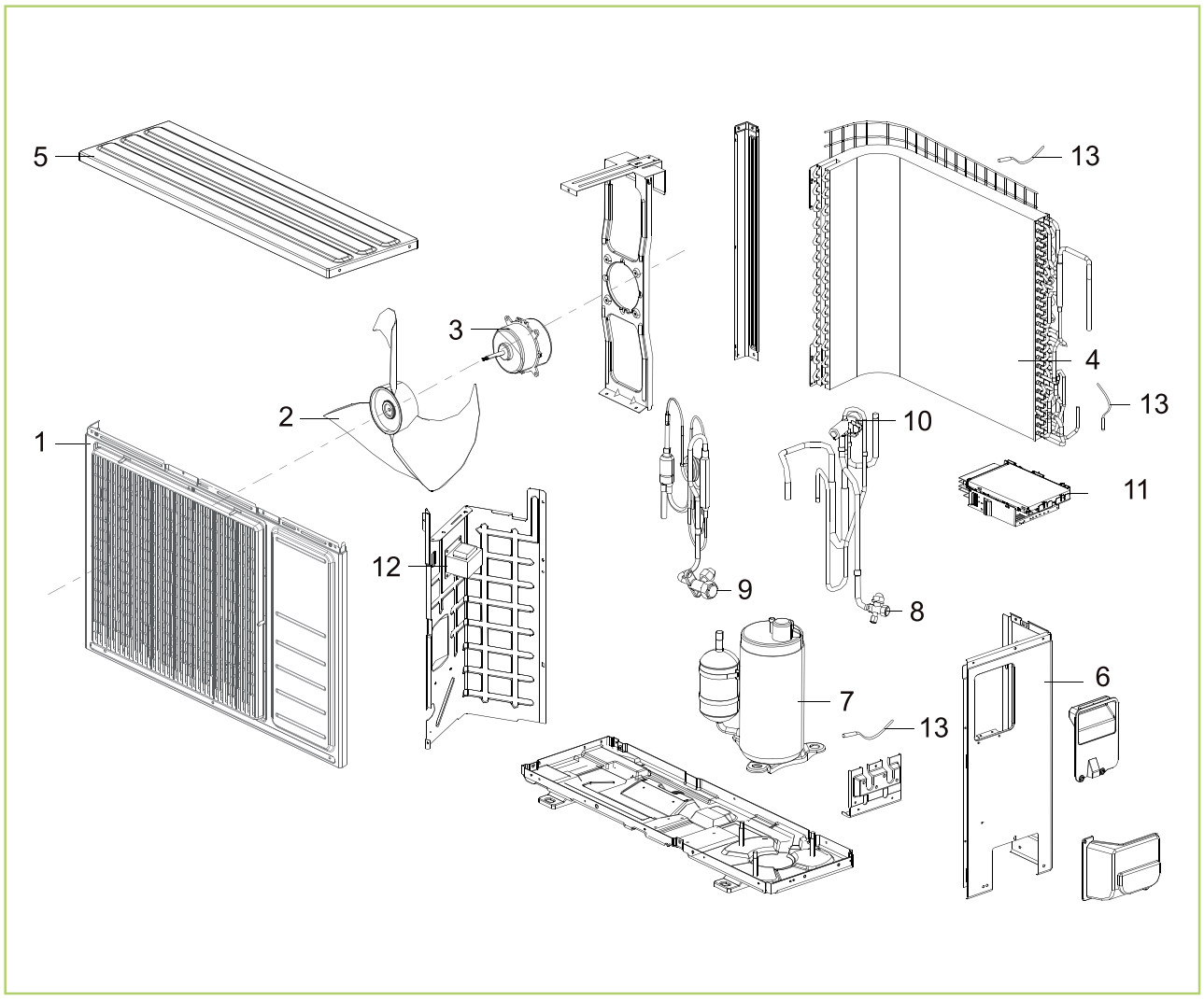

Fig. 56: Exploded view of the unit ML 263 DC AT-523 DC AT

We reserve the right to modify the dimensions and design as part of the ongoing technical development process.

14.4 Spare parts list - Outdoor unit

Please contact REMKO GmbH & Co. KG directly to order spare parts. All of the spare parts numbers for your unit can be found in the download area at www.remko.de.

No.	Designation	ML 263 DC AT	ML 353 DC AT	ML 523 DC AT
1	Front panel	On request by providing the serial number		
2	Fan blade, condenser			
3	Fan motor, condenser			
4	Condenser			
5	Cover panel			
6	Side panel			
7	Compressor, cpl.			
8	Shut-off valve, suction pipe			
9	Shut-off valve, liquid pipe			
10	Reversing valve			
11	E-box, cpl. (incl. control board)			
12	Choke			
13	Temperature probes, set			
	Spare parts not illustrated			
	Crankcase heating	On request by providing the serial number		
	Condensate tray heating			

To ensure the correct delivery of spare parts, please always the device type with the corresponding serial number (see type plate).

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Thanks to intensive training, our consultants are always completely up-to-date in terms of technical knowledge. This has given us the reputation of being more than just an excellent, reliable supplier:
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REMKO offers not just a well established sales network both nationally and internationally, but also has exceptionally highly-qualified sales specialists.
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SFIb**Customer Service**
Our equipment operates precisely and reliably. However, in the event of a fault, REMKO customer service is quickly at the scene. Our comprehensive network of experienced dealers always guarantees quick and reliable service.

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Air conditioning and heating technology

Im Seelenkamp 12	D-32791 Lage
Postfach 1827	D-32777 Lage
Telephone	+49 5232 606-0
Telefax	+49 5232 606-260
E-mail	info@remko.de
Website	www.remko.de

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